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DEFIANCE MANUFACTURING CO.

NEW YORK.

BOSTON.

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DEFIANCE MANUFACTURING CO



DRAWING MATERIALS

ARCHITECTS & ENGINEERS'
SUPPLIES

BLUE AND BLACK PRINTS
LITHOGRAPHIC REPRODUCTIONS

EXECUTIVE OFFICES
NEW YORK.

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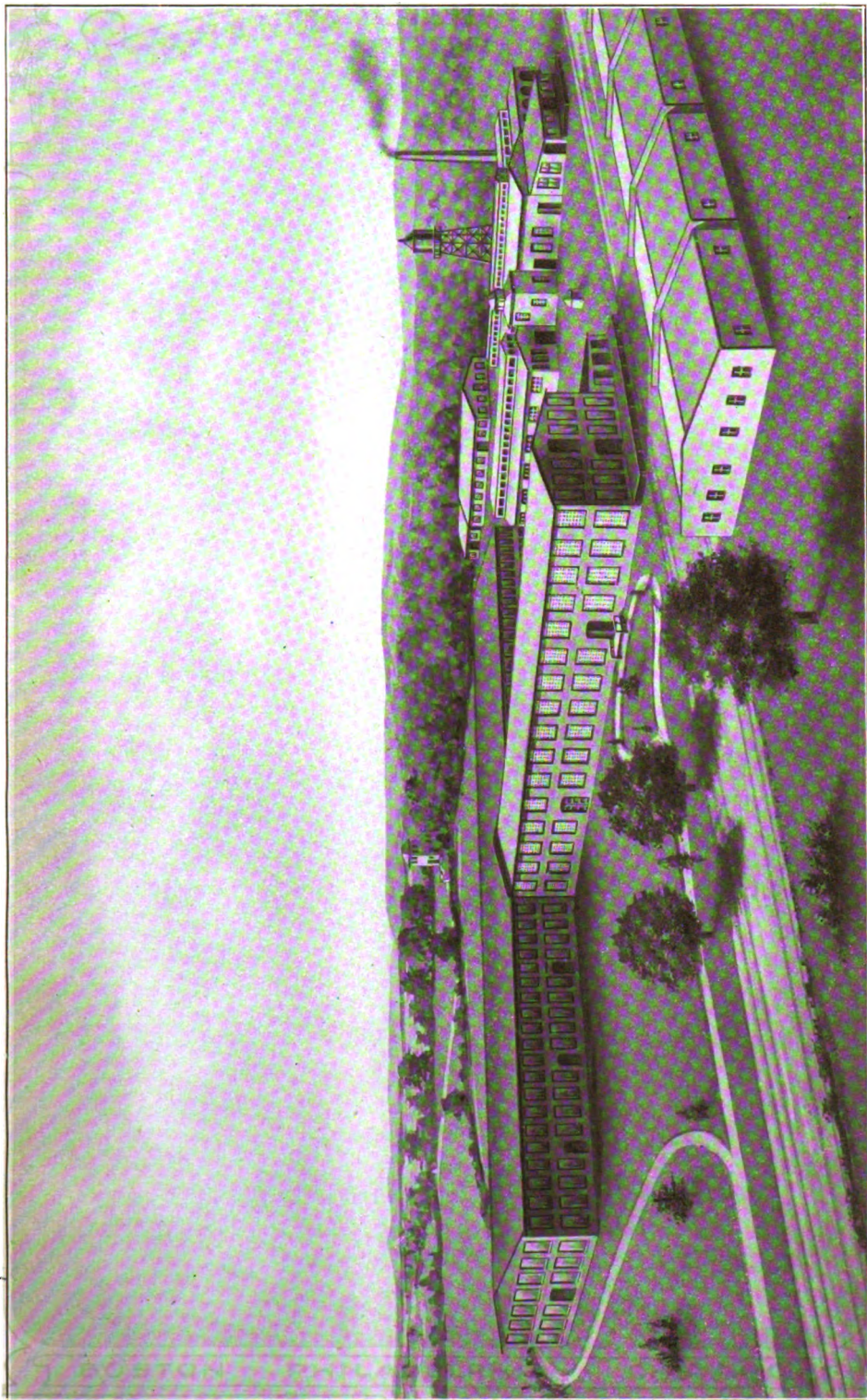
By

DEFIANCE MANUFACTURING COMPANY

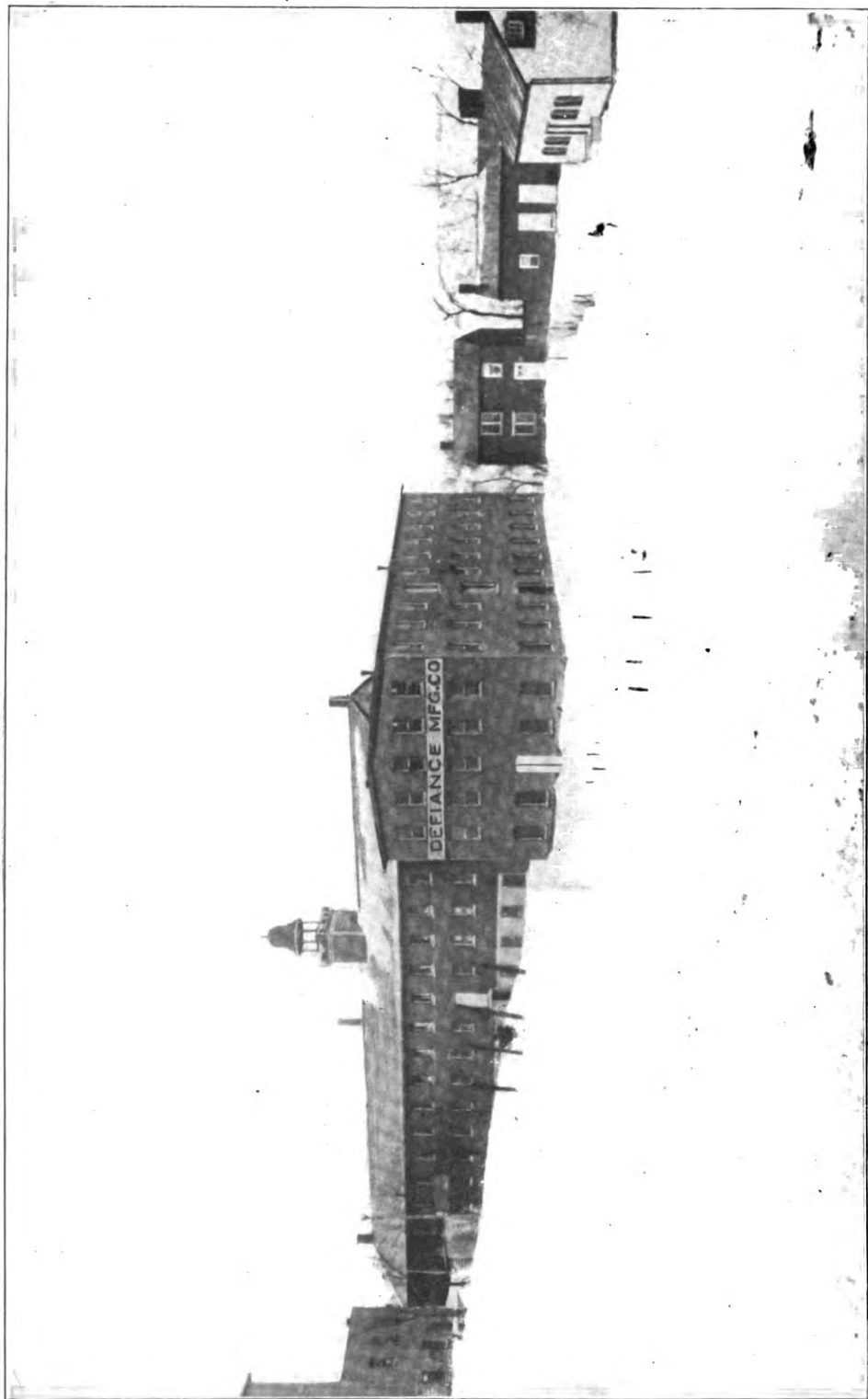
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Apr. 8, 1965 GT



DEFIANCE MILLS



DEFIANCE FACTORY

INTRODUCTORY

IN presenting this edition of our catalogue, we take the opportunity of thanking our numerous patrons who have made its publication possible.

As heretofore, our aim is to supply the highest grade of goods we can manufacture and import.

Every article listed has been selected as representing the very finest of its kind.

Many of the lines are manufactured in our own plants, which are striving each day to improve their output wherever possible.

In order to enable our patrons to obtain prompt and satisfactory service, we have established branches in Boston, Philadelphia and Chicago.

We shall be pleased at all times to offer our services, in any manner possible, for the selection of goods, also to quote prices on any special requirements or instruments not contained in this catalogue.

We have installed the largest and most modern plants for sensitizing blue and black print papers and cloths; reproducing tracings by the Black and Blue Print Process, and an entirely different Lithographic process for the reproduction of prints on cloth, paper, and tracing cloth. With this equipment we are in a position to reproduce all classes of work in a prompt and efficient manner.

DEFIANCE MANUFACTURING CO.

NOTICE

Ordering

When ordering, kindly give the Catalogue number of article, and, when necessary—like papers—size, thickness, color, etc., or when ordering tapes, length in feet, etc. These important particulars, when not given, sometimes cause annoying delays.

Shipping Directions

State whether you wish your goods shipped by express or freight. Packages or parcels weighing less than 50 to 60 pounds will be forwarded more safely, more expeditiously, and in most instances equally as cheap by express, instead of freight.

Freight shipments usually require packing boxes, *which will be charged at cost.*

Small articles weighing one pound and less can be sent by express, prepaid; or by mail at one cent an ounce, and such charges will be added to the price of the goods. Registering mail matter lessens the risk of loss.

We cannot be responsible for goods lost or damaged in transmission by mail. When requested, we can have all mail packages, not exceeding \$20.00 in value, insured against loss for a nominal charge.

Where no shipping directions are given, we send goods according to our best judgment.

Remittances

Remittances may be made either by bank draft payable to our order, or by post-office money order, or by cash sent by any of the express companies. If cash is forwarded by mail, the letter should be registered. When goods are ordered by express, C. O. D., a remittance to cover packing and express charges both ways must accompany the order, and express charges for collection will be added to the amount of the bill. Collection charges will be saved and goods delivered quicker *by remitting in full with order.*

Accounts

If you have never had an account with us and wish to order goods, send a remittance with order, or first-class references, to insure prompt attention. Failure to remit or send references compels us to make inquiry as to the responsibility of the party ordering, and delays the shipment of goods until we receive satisfactory information.

Guarantee

We guarantee our goods to be exactly as represented, and any article which does not prove entirely satisfactory may be returned to us and will be promptly replaced or money refunded.

Our policy has always been to please our patrons in every respect, believing that a thoroughly satisfied customer is the best advertisement.

Should any cause for complaint arise, prompt notice of same would be greatly appreciated.

ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

DRAWING PAPERS IN SHEETS

WHATMAN'S HAND MADE

Whatman Papers are made with three different surfaces as follows:

H. P., signifies "**Hot Pressed**," has a smooth surface, mostly used for pencil and ink or very fine line drawings.

C. P., signifies "**Cold Pressed**," has a finely grained surface, used for general purposes and water-color drawings.

R., signifies "**Rough**," has a coarsely grained surface, used for very bold drawings and sketchings (Torchon Paper).

In ordering, please state number, size and surface required—**H. P.**, **C. P.**, or **R.**

No. 1. "WHATMAN'S" Drawing Paper.		With H. P. or C. P. surface.	
Cap.....	13 × 17 inches.....	Per quire,	\$0 80
Demy.....	15 × 20 ".....	"	1 25
Medium.....	17 × 22 ".....	"	1 80
Royal.....	19 × 24 ".....	"	2 40
Super Royal.....	19 × 27 ".....	"	2 75
Imperial.....	22 × 30 ".....	"	4 00
Double Elephant	27 × 40 ".....	"	7 50
Antiquarian.....	31 × 53 ".....	"	28 00
".....	31 × 53 ".....	Per sheet,	1 50
No. 2. "WHATMAN'S" Drawing Paper.		With R. surface (Torchon Paper).	
Royal.....	19 × 24 inches.....	Per quire,	\$2 40
Imperial.....	22 × 30 ".....	"	4 00
Double Elephant	27 × 40 ".....	"	7 50
No. 3. "WHATMAN'S" Drawing paper.		Extra heavy, with H. P. , C. P. or R. surface.	
		Per quire.	Per sheet.
Imperial.....	22 × 30 inches.....	\$7 85	\$0 40
Double Elephant	27 × 40 ".....	11 80	70

Samples of Sheet Papers mailed on application, or general Sample Book for 15 cents.

DRAWING PAPERS IN SHEETS—Continued

- No. 6. **"COMPOSITE,"** a good grade of white Drawing Paper for preliminary sketching, suitable for school use; takes ink and color, erases well.

Cap.....	14 × 17 inches.....	Per quire, \$0 18
Medium.....	17 × 22 "	" 35
Royal.....	19 × 24 "	" 45
Imperial.....	22 × 30 "	" 75
Double Elephant	27 × 40 "	" 1 50

SAME PAPER IN ROLLS SEE No. 60

- No. 7. **"AUREL"** Finest Cream Drawing Paper. For description, see No. 63.

Royal.....	19 × 24 inches.....	Per quire, \$0 90
Imperial.....	22 × 30 "	" 1 25
Special.....	24 × 36 "	" 1 75
Double Elephant	27 × 40 "	" 2 00

- No. 8. **"SEPIA"** Highest Grade Cream Drawing Paper. For description, see No. 65.

Royal.....	19 × 24 inches.....	Per quire, \$1 00
Imperial.....	22 × 30 "	" 1 50
Special.....	24 × 36 "	" 2 25
Double Elephant	27 × 40 "	" 2 50

- No. 9. **"ARCADIAN"** High Grade White Drawing Paper. For description, see No. 67.

Royal.....	19 × 24 inches.....	Per quire, \$0 80
Imperial.....	22 × 30 "	" 1 25
Special.....	24 × 36 "	" 1 75
Double Elephant	27 × 40 "	" 2 00

DRAWING PAPERS IN SHEETS—Continued

No. 10. **"IVORY"** Medium and Thick, strong White Drawing Paper. For description, see No. 69.

		Medium, Per quire.	Thick, Per quire.
Royal.....	19 × 24 inches.....	\$1 75	\$2 00
Imperial.....	22 × 30 inches.....	2 40	2 75
Special.....	24 × 36 "	3 50	4 00
Double Elephant	27 × 40 "	4 50	5 00

No. 11. **"EGGSHELL"** Drawing Paper. For description, see No. 73.

Royal.....	19 × 24 inches.....	Per quire, \$1 75
Imperial.....	22 × 30 "	" 2 40
Double Elephant	27 × 40 "	" 4 50

No. 12. **SMOOTH EGGSHELL** Drawing Paper. For description, see No. 76.

Royal.....	19 × 24 inches.....	Per quire, \$1 75
Imperial.....	22 × 30 "	" 2 40
Double Elephant	27 × 40 "	" 4 50

No. 14. **CHARCOAL PAPER.** White.

Royal.....	19 × 25 inches.....	Per quire, \$0 90
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All of the foregoing papers mounted on cardboard or cotton. Prices on application. State number, size and quantity required.

BRISTOL AND MOUNTING BOARDS

No. 20. **REYNOLDS' White Bristol Board.** Smooth surface.

			2 Sheet	3 Sheet	4 Sheet
Cap.....	12½ × 15½ inches.....	Per doz.,	\$0 60	\$0 90	\$1 20
Demy...	14½ × 18½ "	"	90	1 35	1 75
Medium.	16½ × 20½ "	"	1 20	1 80	2 40
Royal...	18½ × 22½ "	"	1 50	2 40	3 10
Imperial	21½ × 28½ " .....	"	....	4 70	6 00

No. 21. **REYNOLDS' White Bristol Board,** printed with border, etc., for U. S.

Patent Office drawings, 10 × 15 inches, 3-ply.....Per doz., \$1 05

No. 26. **WHITE MOUNTING BOARD.**

	4 ply	6 ply	8 ply	10 ply	16 ply
	22 × 28	22 × 28	22 × 28	28 × 44	30 × 40"
Per doz.....	\$0 75	\$1 00	\$1 20	\$3 00	\$5 25
Per sheet.....	08	10	12	30	50

PORTFOLIOS

No. 30. Paper Sides, Cloth Back and Corners.

Sizes,	12 × 16	14 × 18	17 × 22	20 × 26	25 × 31"
Per doz.....	\$6 30	\$7 80	\$10 50	\$14 40	\$19 20

No. 31. Cloth Sides, Leather Back and Corners.

Sizes,	12 × 16	14 × 18	17 × 22	20 × 26	25 × 31"
Per doz.....	\$13 00	\$14 50	\$18 00	\$24 00	\$33 00

DETAIL PAPERS IN ROLLS

"DORIAN," light color, finest grade of Manila Drafting Paper, stands erasing, takes ink and pencil. Made in two surfaces, smooth and ribbed; and three thicknesses, medium, thick, and extra thick.

55A, 55B, 55C. Ribbed surface (**R. S.**).

56A, 56B, 56C. Smooth surface (**S. S.**).

In rolls of about 100-120 lbs., 36", 42", 48", 54" wide.....Per lb., \$0 12

55A.	R. S. }	Medium (60 lbs.).....in rolls of 50 yards.				
56A.	S. S. }		36"	42"	48"	54"
			\$2 30	\$2 75	\$3 25	\$3 50
55B.	R. S. }	Thick (80 lbs.).....in rolls of 50 yards.				
56B.	S. S. }		36"	42"	48"	54"
			\$2 50	\$3 25	\$3 60	\$4 50
55C.	}	Extra Thick (100 lbs.).....in rolls of 50 yards.				
56C.			36"	42"	48"	54"
			\$2 80	\$3 40	\$4 00	\$4 75

"DORIAN," Buff Color, of the same superior stock as the above but is tinted, which allows it to undergo much handling without soiling. Made in three thicknesses—medium, thick, and extra thick.

In rolls of 100-120 lbs., 36", 40", 42", 48", 54" wide.....Per lb., \$0 12

57A.	Medium (60 lbs.).....in rolls of 50 yards.					
		36"	42"	48"	54"	
		\$2 30	\$2 75	\$3 25	\$3 50	
57B.	Thick (80 lbs.).....in rolls of 50 yards.					
		36"	42"	48"	54"	
		\$2 50	\$3 25	\$3 60	\$4 50	
57C.	Extra Thick (100 lbs.).....in rolls of 50 yards.					
		36"	42"	48"	54"	
		\$2 80	\$3 40	\$4 30	\$4 75	

Sample books of these papers sent on request.

DRAWING PAPERS IN ROLLS



No. 63



No. 76

(Reduced facsimile of our labels.)

- No. 59. **"CONQUEROR"** Drawing Paper. A good grade of cream drawing paper. Takes ink and color. Erases well.

In rolls of about 50 lbs.....Per lb., \$0 25

	Per 100 yds.	50 yds.	25 yds.	Per yd.
30".....	\$7 45	\$4 00	\$2 10	\$0 11
36".....	9 00	4 75	2 55	13
42".....	12 10	6 40	3 40	17

- No. 60. **"COMPOSITE."** A good grade of White Paper for preliminary sketches and detail work generally. Takes ink and color. Erases well.

In rolls of about 50 lbs.....Per lb., \$0 19

	100 yds.	50 yds.	25 yds.
36".....	\$4 50	\$2 50	\$1 50
42".....	5 50	3 00	1 75

No. 6 is the same paper in sheets.

- No. 62. **"CROCUS"** Drawing Paper. The finest buff. Made of superior stock. Its excellent erasing qualities, combined with its ability to take ink and color, make it a very popular paper among draughtsmen. It will not break in folding, and its buff tint makes it agreeable to the eyes.

In rolls of about 50 lbs.....Per lb., \$0 29

	Per 100 yds.	50 yds.	25 yds.	10 yds.	Per yd.
30".....	\$9 70	\$5 00	\$2 70	\$1 15	\$0 12
36".....	10 85	5 60	3 10	1 30	14
42".....	14 00	7 30	4 00	1 65	19
60".....	19 75	10 25	5 30	2 50	30

Sample books of these papers sent on request.

DRAWING PAPERS IN ROLLS—Continued

- No. 63. **"AUREL"** Drawing Paper. This paper is made of the same stock as No. 62, but is a rich cream color and its surface is a little smoother. This is sometimes preferred to No. 62 on account of its richer color. It lists at the same price as No. 62.
No. 7 is the same paper in sheets.

- No. 65. **"SEPIA"** Cream Drawing Paper. The highest grade of cream drawing paper.

In rolls of about 50 lbs., 30", 36", 42".....Per lb., \$0 33

	Per 100 yds.	50 yds.	25 yds.	10 yds.	Per yd.
30".....	\$10 25	\$5 50	\$2 90	\$1 20	\$0 13
36".....	12 50	6 30	3 35	1 35	15
42".....	16 00	8 75	4 75	2 00	22

No. 8 is the same paper in sheets.

- No. 67. **"ARCADIAN"** White Drawing Paper. A high grade, pure white paper for general use. Takes ink and color, has a slightly grained surface and erases excellently. As an all-around white paper it has no equal.

In rolls of about 50 lbs., 30", 42".....Per lb., \$0 35

	Per 50 yds.	25 yds.	10 yds.	Per yd.
36".....	\$7 15	\$3 90	\$1 60	\$0 20
42".....	9 00	4 80	2 10	24
62".....	12 60	6 90	3 00	35

No. 9 is the same paper in sheets.

- No. 69. **"IVORY"** Drawing Paper. **Medium.** An exceptionally strong white drawing paper of the highest quality. Smooth surface, with the slightest grain. Suitable for drawings that are to stand rough handling. Can be folded without creasing.

In rolls of about 50 lbs.....Per lb., \$0 45

	Per 10 yds.	Per yd.
36".....	\$2 10	\$0 25
42".....	2 70	30

No. 10 Medium is the same paper in sheets.

Sample books of these papers sent on request.

DRAWING PAPERS IN ROLLS—Continued

No. 69H. **"IVORY"** Drawing Paper. **Thick.** The same excellent stock as No. 69, but a heavier paper.

In rolls of about 50 lbs.....	Per lb., \$0 45	
	Per 10 yds.	Per yd.
36".....	\$2 70	\$0 30
62".....	4 75	50

No. 10H Thick is the same paper in sheets.

"DEFIANCE" EGGSHELL PAPERS

These **Eggshell** Drawing Papers are made from the finest linen stock. The peculiar pebbled surface especially adapts them to water-color and other bold sketches, showing these sketches to the best advantage. This paper is used for elevations, perspectives, and all other finished drawings.

No. 73. **"DEFIANCE" EGGSHELL.** Pebbled surface. **Thick.**

In rolls of about 50 lbs., 36", 42", 58" wide.....	Per lb., \$0 50	
	Per 10 yds.	Per yd.
36".....	\$3 20	\$0 34
42".....	3 60	38
58".....	4 60	50

No. 73H. **"DEFIANCE" EGGSHELL.** Pebbled surface. **Extra Thick.**

In rolls of about 60 lbs., 59½" wide.....	Per lb., \$0 50	
	Per 10 yds.	Per yd.
59½".....	\$6 50	\$0 75

No. 76. **"DEFIANCE" EGGSHELL.** Smooth surface. **Thick.** This paper is made of the same stock as Nos. 73 and 73H, but has a hot pressed surface.

In rolls of about 50 lbs.....	Per lb., \$0 50	
	Per 10 yds.	Per yd.
36".....	\$3 20	\$0 34
42".....	3 60	38
58".....	4 60	50

SPECIAL PAPER—If a paper suitable for certain work is not included in our very complete assortment, kindly submit samples or a complete description of the characteristics of the paper wanted and our best efforts will be extended to secure the desired paper and price.

DEFIANCE TRACING CLOTHS



No. 90.

No. 90. **"DEFIANCE"** Tracing Cloth. Made by us in U. S. A. Rolls of 24 yards. One side glazed, the other dull.

24" wide.....	Per roll, \$6 75
30" "	" 7 25
36" "	" 8 10
42" "	" 10 75



No. 91.

No. 91. **"STIRLING"** Brand Tracing Cloth. Patented. Does not require Tracing Cloth Powder. Rolls of 24 yards. One side glazed, the other dull.

30" wide.....	Per roll, \$7 50
36" "	" 8 25
42" "	" 11 25
48" "	" 14 95
54" "	" 15 90



No. 92.

No. 92. **"DEFIANCE"** Tracing Cloth. Second best grade. Rolls of 24 yards. One side glazed, the other dull.

30" wide.....	Per roll, \$5 00
36" "	" 6 50
42" "	" 8 25

Standardize your drawing by having your titles and borders printed on tracing cloth or tracing paper, in ink which will not smear or readily erase.

PRICES ON APPLICATION.

TRACING CLOTH PREPARATIONS

LIQUID TRACING CLOTH CLEANER



No. 95

- No. 95. This liquid is excellent for removing pencil marks, dirt and grease spots from tracings. It has no effect on waterproof ink, and does not injure the surface for inking. The piece of flannel, furnished with each bottle, is moistened and gently rubbed over the surface to be cleaned.

In 2 ounce bottles.....Each, \$0 35

TRACING CLOTH POWDER.

- No. 96. Tracing Cloth Powder rubbed evenly with a piece of flannel over the cloth and then removed will make the cloth take the ink readily.

In tin shakers....Each, \$0 15



No. 96

INKOFF

- No. 97. "Inkoff." For erasing Black Waterproof Drawing Ink lines and figures without injury to the tracing cloth.

In 1 ounce bottles, with blotter, cloths and directions for use.....Each, \$0 45



No. 98

- No. 98. **Transparency.** For transparentizing Drawings and Tracings. Especially valuable for use on drawings made on bristol board or heavy white drawing paper, Sepia negatives on cloth or paper, old or soiled drawings or tracings of any kind. Will affect neither ink nor pencil marks, nor cause paper or cloth to become brittle. Transparency is not inflammable.

In cans, 4 oz.	1 pt.	Pt.	Qt.
Each.....	\$0 50	\$1 00	\$1 50
			\$2 50

Directions for using furnished with each can.

TRACING PAPERS IN ROLLS



No. 104.



No. 110.



No. 166.

(Reduced facsimile of our labels.)

The following assortment of tracing paper is one of the most complete ever put forward. It is not a mere mass of material gathered together without any respect for the different characteristics of each paper, but a careful selection made by an expert who judged the papers on their merits only. The architects, engineers, artists, and other users of tracing paper, can find among the following a paper that is exactly suited to their purpose.

No. 100 **"DORIAN."** A manila detail tracing paper for large, full-size drawings. In rolls of 42" and 48" wide.

	Per 100 yds.	50 yds.
42".....	\$2 45	\$1 25
48".....	3 00	1 60

No. 102. **"ECONO."** An inexpensive white tracing paper for detail tracing. Very transparent. In rolls of 42" and 48" wide.

	Per 100 yds.	50 yds.
42".....	\$2 80	\$1 50
48".....	3 50	1 80

No. 104. **"PARCHMENT."** An excellent thin white tracing paper of pure rag stock, very tough, with fine erasing qualities.

In rolls of 25 yards, 36" wide.....	Per roll, \$1 60
" " " 50 " 36" "	" " 3 00

No. 106. **"PARCHMENT."** Like No. 104, but thicker and stronger.

In rolls of 25 yards, 36"....	\$1 85	In rolls of 25 yards, 42"....	\$2 25
" " " 50 " 36"....	3 50	" " " 50 " 42"....	4 25

Sample book of these papers sent on request.

TRACING PAPERS IN ROLLS—Continued

No. 107. **"VARUS."** Medium White Tracing Paper. Very strong and transparent.

In rolls of 22 yards, 44" wide..... Per roll, \$2 00

No. 108. **"ALARIC."** Thick White Tracing Paper. Erases excellently.

In rolls of 20 yards, 40" wide..... Per roll, \$2 00

No. 110. **"IRIS."** Thick glazed cream tinted Tracing Paper. Very strong and transparent.

In rolls of 20 yards, 40" wide..... Per roll, \$2 00

No. 125. **"ARAGON."** The finest natural Tracing Paper. Unglazed.

In rolls of 44 yards, 57" wide..... Per roll, \$3 80

"SAGITTA" Tracing and Sketching Papers. Good all-around papers for detail work. Erase excellently, and take ink and color. Good blue prints can be made from pencil sketches on this paper. Can be used as tracing paper.

No. 136. **"SAGITTA." Thin.**

36" wide.....	Per roll of 50 yards, \$1 75
60" "	" 50 " 2 00

No. 137. **"SAGITTA." Medium.**

36" wide.....	Per roll of 50 yards, \$2 00
60" "	" 50 " 3 25

No. 137H. **"SAGITTA." Heavy.** This paper is thick enough to be used as a drawing paper, and notwithstanding its thickness is very transparent.

31" wide.....	Per roll of 50 yards, \$2 50
36" "	" 50 " 3 25
62" "	" 50 " 4 50

Sample book of these papers sent on request.

TRACING PAPERS IN ROLLS—Continued

No. 140. **"TRITON."** Thin bond Tracing Paper. Unglazed. Excellent quality. Transparent.

In rolls of 20 yards, 42" wide..... Per roll, \$1 35

No. 142B. **"SCOTIA."** Medium bond Tracing Paper. Unglazed.

In rolls of 20 yards, 42" wide..... Per roll, \$2 00

No. 146. **"CLOTAR."** A thin unprepared paper. Glazed. Very strong and transparent.

In rolls of 20 yards, 43" wide..... Per roll, \$1 50

No. 165W. **"TRALUCID."** Thin prepared Tracing Paper. Very transparent.

In rolls of 20 yards, 43" wide..... Per roll, \$2 90

No. 165B. **"AZURE."** Same as No. 165W, but tinted blue.

In rolls of 20 yards, 43" wide..... Per roll, \$2 90

No. 166. **"SALINE."** Medium prepared Tracing Paper. Bluish tint. Used as a substitute for cloth.

In rolls of 20 yards, 40" wide..... Per roll, \$3 20

No. 168. **"CYRENE."** Thick prepared Tracing Paper. Strong and transparent. Excellent for ink and color work.

In rolls of 20 yards, 40" wide..... Per roll, \$3 60

No. 170. **CALIFORNIA TRACING VELLUM.** Very strong and transparent.

Equally good for ink or color work. Stands erasing well and does not deteriorate.

36" wide.....	Per roll of 20 yards, \$4 00
42" "	" 20 " 5 00

Sample book of these papers sent on request.

BLUE PRINT PAPERS

The assortment of sensitized Blue Print Papers listed on the following pages has been selected after an exhaustive examination and test of various Domestic and Foreign Papers, and will fulfill every requirement.

Particular care is exercised in the sensitizing of our Blue Print Papers, only the purest of chemicals being employed.

Most modern machinery and equipment has been installed in our Coating Departments, and no expense has been spared to provide the most up-to-date plant to be found on this Continent.

DEFIANCE Papers are made for us by the celebrated "**Johannot Mills.**" They are manufactured from absolutely chemically pure stock, and for tensile strength, uniformity of weight and finish, are unrivaled. All **Johannot** Papers are water-marked.

"STIRLING" Papers are of high grade, chemically pure stock. These are imported papers, of even strength and finish, and of excellent printing and keeping qualities.

"AMERICAN" Papers are of specially manufactured Domestic stock, and will be found to compare favorably with many of the high grade Blue Print Papers of other manufacturers. Specially recommended for shop use.

We manufacture our Blue Print Papers regularly in four different printing speeds, but can also supply our papers with any special solution desired to meet local conditions.

Slow Printing—Requiring an exposure of about four minutes in bright sunlight. This speed is particularly recommended for use during the summer months, also for making Positive Blue Prints from Sepia negatives. Of excellent keeping qualities, producing a very rich blue with sharply defined lines.

Rapid Printing—Requiring an exposure of about one minute in bright sunlight.

Extra Rapid Printing—Requiring an exposure of about thirty or forty seconds in bright sunlight.

Electric . Rapid Printing—Specially prepared for printing on electric machines.

In ordering, please specify the speed desired, whether Slow, Rapid, Extra Rapid or Electric Rapid, thus preventing any delay in executing orders.

"DEFIANCE" BLUE PRINT PAPERS



No. 200.



No. 206.

(Reduced facsimile of our labels.)

In ordering, please specify the speed desired, whether Slow, Rapid, Extra Rapid or Electric Rapid, thus preventing any delay in executing orders.

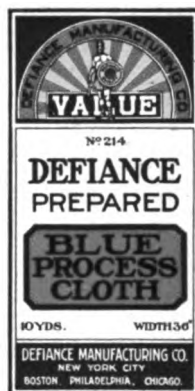
No. 200.	"DEFIANCE PARCHMENT."	Extra thin.			
		Width,	30"	36"	42"
	Per roll of 10 yards, prepared.....		\$1 00	\$1 35	\$1 50
	50 "		4 25	5 25	6 50
No. 201.	"DEFIANCE PARCHMENT."	Thin.			
		Width,	30"	36"	42"
	Per roll of 10 yards, prepared.....		\$1 30	\$1 50	\$1 75
	50 "		5 50	6 50	7 75
No. 202.	"DEFIANCE PARCHMENT."	Medium thick			
		Width,	30"	36"	42"
	Per roll of 10 yards, prepared.....		\$1 50	\$1 70	\$1 90
	50 "		6 00	7 00	8 00
No. 203.	"DEFIANCE PARCHMENT."	Thick.			
		Width,	30"	36"	42"
	Per roll of 10 yards, prepared.....		\$1 60	\$1 80	\$2 00
	50 "		7 00	8 00	9 25
No. 206.	"DEFIANCE SATIN."	Medium Thick.			
		Width,	30"	42"	54"
	Per roll of 10 yards, prepared.....		\$1 40	\$1 80	\$2 50
	50 "		5 75	6 75	7 75
No. 207.	"DEFIANCE SATIN."	Thick.			
		Width,	30"	36"	42"
	Per roll of 10 yards, prepared.....		\$1 50	\$1 75	\$2 00
	50 "		6 50	7 75	8 75

Sample book of these papers sent on request.

"STIRLING" BLUE PRINT PAPERS & "DEFIANCE" BLUE PRINT CLOTHS



No. 212.



No. 214.

(Reduced facsimile of our labels.)

In ordering, please specify the speed desired, whether Slow, Rapid, Extra Rapid or Electric Rapid, thus preventing any delay in executing orders.

No. 210. "STIRLING." Thin.

	Width,	30"	36"	42"	54"
Per roll of 10 yards, prepared.		\$0 90	\$1 00	\$1 15	\$1 75
" " 50 "	"	3 25	4 50	5 00	7 75

No. 212. "STIRLING." Medium thick.

	Width,	30"	36"	42"
Per roll of 10 yards, prepared.....		\$1 10	\$1 25	\$1 50
" " " 50 " "		5 00	6 00	7 00

No. 214. "DEFIANCE" BLUE PRINT CLOTH. Medium.

	Width,	30"	36"	42"	54"
Per roll of 10 yards, prepared.		\$2 75	\$3 00	\$4 25	\$6 00

No. 216. "DEFIANCE" BLUE PRINT CLOTH. Extra thin.

	Width,	30"	36"	42"
Per roll of 10 yards, prepared.....		\$3 50	\$4 00	\$5 00

Sample book of these papers and cloths sent on request.

"AMERICAN" BLUE PRINT PAPERS

Medium Quality



No. 220.



No. 222.

(Reduced facsimile of our labels.)

In ordering, please specify the speed desired, whether Slow, Rapid, Extra Rapid or Electric Rapid, thus preventing any delay in executing orders.

No. 220. "AMERICAN." Medium thick.

	Width,	30"	36"	42"
Per roll of 10 yards, prepared.....		\$0 65	\$0 75	\$0 85
" " 50 " "		2 75	3 25	3 75

No. 221. "AMERICAN." Thick.

	Width,	30"	36"	42"
Per roll of 10 yards, prepared.....		\$0 80	\$0 90	\$1 00
" " 50 " "		3 50	4 25	4 75

No. 222. "AMERICAN." Thin.

	Width,	30"	36"	42"
Per roll of 10 yards, prepared.....		\$0 60	\$0 70	\$0 80
" " 50 " "		2 50	3 00	3 50

We can quote special prices on any of the above Blue Print Papers for large quantities or contracts.

PRICES FOR SHEETS CUT TO ANY DESIRED SIZE ON APPLICATION.

“SEPIA” SOLAR PAPER



No. 226.



No. 227.

(Reduced facsimile of our labels.)

Sepia Solar Paper and Cloth give a negative white line copy of original on black-brown background. As this background is opaque, these prints can, when made on thin papers or cloth, be used as negatives, from which any number of positive prints can be made.

Regular Blue Print Paper can also be used for making positive prints from Sepia negatives, producing a blue line print on white background.

Directions and box of Sepia fixing salts with each roll.

No. 226. “SEPIA” PAPER. Thin.

	Width,	30"	36"	42"
Per roll of 10 yards, prepared.....		\$1 75	\$2 00	\$2 25
“ “ 50 “ “		8 50	9 75	11 00

No. 227. “SEPIA” PAPER. Medium thick.

	Width,	30"	36"	42"
Per roll of 10 yards, prepared.....		\$1 75	\$2 00	\$2 25
“ “ 50 “ “		8 50	9 75	11 00

Sample book of these papers sent on request.

"SEPIA" SOLAR CLOTH



No. 230.



No. 232.

(Reduced facsimile of our labels.)

No. 230. "SEPIA" CLOTH. Extra thin.

	Width,	30"	36"	42"
Per roll of 10 yards, prepared.....		\$5 00	\$5 50	6 60

No. 232. "SEPIA" CLOTH. Medium.

	Width,	30"	36"	42"	54"
Per roll of 10 yards, prepared.		\$4 00	\$4 50	\$5 75	\$9 50

"SEPIA" FIXING SALTS

No. 234A. Per 2-ounce can.....	\$0 10
No. 234B. Per 4-ounce can.....	15
No. 234C. Per 1 lb. can.....	40

DIRECT BLACK PROCESS PAPER



No. 240.



No. 240T.

(Reduced facsimile of our labels.)

Our **Direct Black Process Paper** is exposed in the same manner as Blue Print Paper, and requires water bath only. No chemical developer is necessary. Our Papers are specially prepared and do not become brittle.

Excellent prints are obtained—a sharply-defined line on a white background.

No. 240. **"DEFIANCE" Direct Black Line Paper. Medium thick.**

Width,	30"	36"	42"
Per roll of 10 yards, prepared.....	\$2 50	\$3 00	\$3 50

No. 240T. **"DEFIANCE" Direct Black Line Paper. Thin.**

Width,	30"	36"	42"
Per roll of 10 yards, prepared.....	\$2 50	\$3 00	\$3 50

ERASING FLUIDS



No. 242W.

No. 242W. **White "Defiance" Erasing Fluid.** For making alterations and additions on Blue Prints.

Per bottle \$0 20

No. 242R. **Red "Defiance" Erasing Fluid.** For making or tinting Blue Prints.

Per bottle \$0 20

No. 242Y. **Yellow "Defiance" Erasing Fluid.** For making or tinting Blue Prints.

Per bottle \$0 20

No. 242S. **"Sepia" Erasing Fluid.** For making alterations on Sepia Prints.

Per bottle \$0 20

ADHESIVE TAPES

STYK-UM-PHAST GUMMED CLOTH

No. 244. **STYK-UM-PHAST.** A Passepartout tape, made of gummed cloth, $\frac{3}{8}$ " wide. Put up in special boxes, which protects tape from atmospheric changes. In White, Red, Grey, Light Green, Dark Green, Ecu, Brown, Maroon, Blue and Black.

Per 10-yard roll..... \$0 10



No. 244.



No. 246.

TRANSPARENT ADHESIVE TAPE

No. 246. Strip of Paper, 20' x $\frac{3}{4}$ " wide, gummed on one side, on metal holder.

Per dozen \$0 60

VERTICAL ELECTRIC BLUE PRINT APPARATUS

Patented February 7, 1903, December 7, 1909, August 2, 1910, November 8, 1910,
April 21, 1914. Other Patents Pending.

In order to offer the engineering departments of large industries and users in general, a highly efficient vertical cylindrical Blue Print Machine, considerable money has been expended to develop the apparatus illustrated and described on pages 31 and 33, and we have overcome all objectionable features common to such machines heretofore offered. In order to point out all the advantages we will, in a general way, describe the construction of this apparatus.

Reference to Figure 1 will show the structure of the steel frame, the liquid controlling lowering device, the return device, the electric automatic cut-out, the off shot sheaves, the electric commutating device, the cables, the electric arc lamp, and its controller; also the guide sheaves and the wooden spacers.

The steel frame No. 1 is built of $\frac{1}{4}$ -inch angle steel of proper weight and carries five steel rings of proper size, which are rolled on special machinery to insure exact dimensions and are electrically welded. Three of these steel rings No. 2, are constructed out of angle steel; two of these carry the glass cylinder, the third ring acts as a base or foundation for the frame. The remaining two rings No. 3, are flat and act as guides for the cable of the automatic stretching device. No. 4, is the liquid controlling cylinder; No. 5, the speed controller; No. 6, the return device; No. 7, the automatic electric cut-out device; No. 8, the off shot sheaves; No. 9, the commutating device; No. 10, the electric lamp controller; No. 11, the adjustable stop (not shown); No. 12, the electric cables; No. 13, the insulated sheaves; No. 14, the arc lamp; No. 15, the wooden spacers; No. 16, the rack; all of these parts, as will be noted, are entirely supported by the steel frame, and are either bolted or riveted thereto. They positively guarantee a structure wherein it is possible to maintain each part in its proper place when so located, assuring a perfect alignment of all the working parts, as will be noted. Figure 1 shows the steel structure with all the electrical and mechanical appliances to operate and to control the various speeds of the lamp. The glass, and curtain attachment are not shown on this figure. The reason for showing this frame structure by itself, is to call the purchaser's attention to the fact that the construction is sufficiently strong, not only to support the above mentioned appliances, but also to support the glass cylinder and curtains and does not depend on the glass cylinder to steady and support the same, **as is the case in other machines offered to the trade.** There is no wood or makeshift material used in this construction; all parts are interchangeable; the iron and steel parts being machined to a standard and the insulating parts are molded in steel molds and made of insulating compounds of proper quality to insure long life and service.

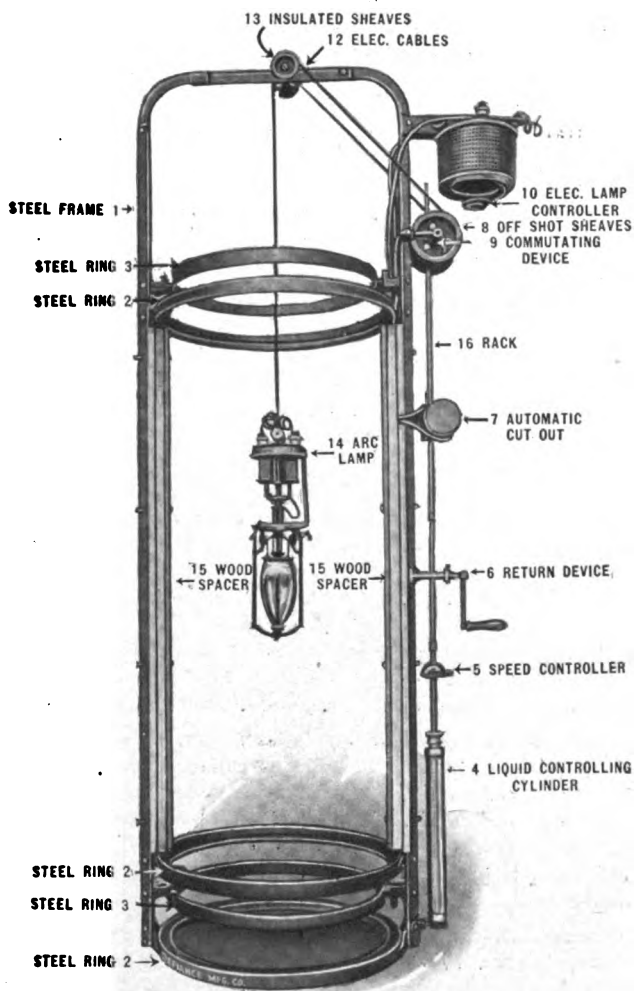


Fig. 1

VERTICAL ELECTRIC BLUE PRINT APPARATUS—Continued

Figure 2 shows the complete machine consisting of all the essential parts mentioned in figure one, and the same numerals indicating the same parts; in addition, it shows the automatic self-adjusting, self-stretching curtain No. 17, which consists of carrier No. 18, bronze journals No. 19, wherein the roller 17 revolves and is mounted adjustably in carrier No. 18. Said adjustable bronze bearings are attached to adjustable springs to control the pressure of the roller against the glass. The sheaves No. 20, which are larger in diameter than the curtain roller No. 17, are connected by a single cable which is guided on ring 3, over sheaves No. 21. The automatic curtain roller No. 17, is provided on the inside with a spring of proper size. The canvas curtain is fastened on one end to the roller, the other end is secured to the wooden spacers.

The carriers No. 18 are provided with proper steel rollers and connected with two steel rods No. 22. This curtain structure and its carriers is also supported in its entirety by the steel frame as shown in Figure 1, the rings No. 2 providing a steel path for this mechanism when the curtain roller is being operated. It will be seen at a glance that this particular roller curtain possesses new and valuable features due to the difference in diameter of sheaves No. 20 and roller No. 17. The function of this combination is to provide an additional tension on the curtain roller when the cylinder is in a loaded position, assuring not only a positively perfect contact, but also adjusting itself to any uneven stretching of the curtain that may occur, the spring assuming its normal tension when curtain is returned to the unloaded position. The pressure of the cable in this case is not exerting any strain on the glass cylinder as is the case in other machines. The only strain the glass cylinder in this construction is subject to, is the actual pressure of the canvas against the same, insuring a perfect contact at all times. The arc lamp No. 14, especially built for this purpose, is of high efficiency and great candle power.

This machine can be furnished with a half cylinder and one curtain, making it a half cylindrical printer. It will be readily seen that this is another great advantage to the purchaser of a half-cylindrical machine, as he can readily, at any time, add the additional glass cylinder and curtain to the half cylindrical machine and thereby make it a standard full cylindrical machine, which would cost him but little more than if he originally purchased a full cylindrical machine.

The steel frame, curtains, and lowering device, are patented. The liquid cylindrical control is **an exclusive feature**, the patent on same having been passed upon by the highest court. The liquid control cylinder gives a range of speed from three seconds per foot travel to thirty-eight seconds per foot travel, or any intermediate speed between the two above speeds mentioned, making it possible to make blue prints of detail paper as well as tracing paper, as the time exposure is not limited. It will be seen in Figures 1 and 2, that there are no wire cables, weights, or any other superfluous balancing propositions used between the liquid cylindrical regulating device and the insulated off shot sheaves. These sheaves are connected to the liquid regulator by

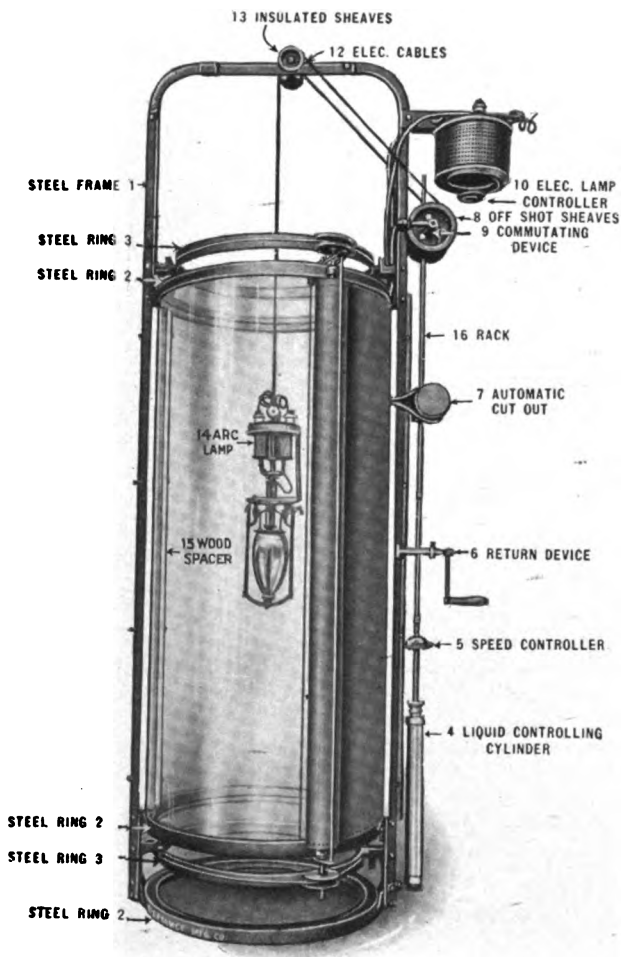


Fig. 2

VERTICAL ELECTRIC BLUE PRINT APPARATUS—Continued

means of one continuous rack bar, which is also provided with an adjustable stop to operate and cut out the electric lamp at any predetermined point of travel through the glass cylinders. The cables that supply the current to the arc lamp are specially constructed for this purpose of many strands of flexible wire and are highly insulated and supported at all times on the insulated sheaves Nos. 8 and 13. The total load carried by these cables is 12 pounds, whereas the pressure due to the compounding of pinion and sheaves exerted against the liquid control is 60 pounds. This load is entirely taken care of by rack No. 16, positively assuring a combination which can be relied upon at all times to operate perfectly.

The automatic curtains are another feature to which we desire to call attention, being self-adjusting, self-stretching, and are provided with an operating bar No. 22, which is not found on any other machine manufactured. Instead of the curtain being revolved against the cylinder as is the practice on other machines, this curtain revolves in bronze journals mounted in the two carriers and said carriers being mounted with two coupling bars; one of these bars acting as the operating bar to wind or unwind the curtains on the roller. This construction obviates the necessity of taking hold of the roller to operate the same, as the roller in this construction revolves independently of the operating bar and has proven by actual practice to be the most rapid roller curtain in loading and unloading the cylinder.

It will be noted by referring to Figure 1 that this particular steel frame does not depend on the uncertainty of wood to support the expensive glass cylinder **as is used in other machines**. This, of course, is of great advantage to the purchaser, as it enables us to ship machines with glass and other parts assembled, and set up ready for use, when unboxed. **All that is then necessary is to connect line wires to No. 23, fasten lamp to hanger when machine is ready for operation.** As there is no assembling to be done there is no skilled labor required to erect the same, as it is self-contained and portable.

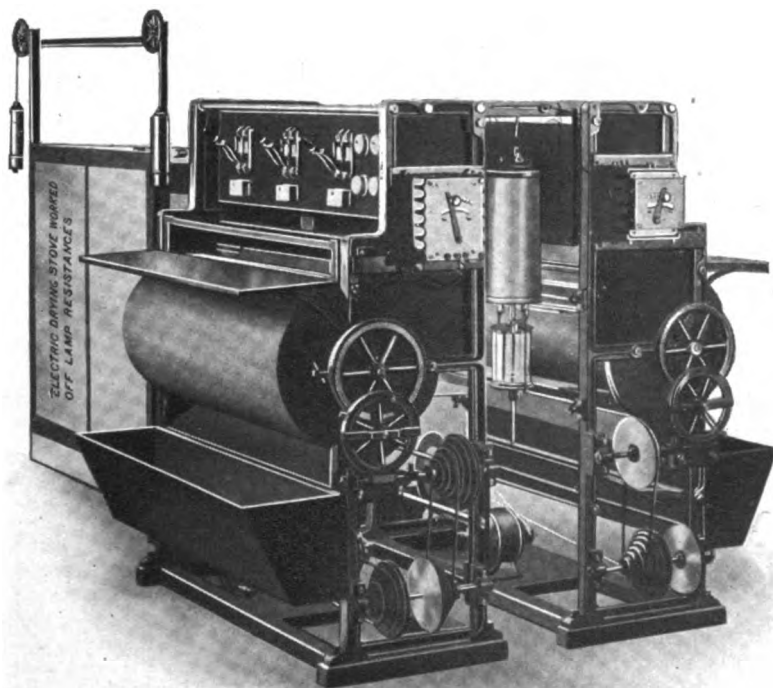
FULL CYLINDRICAL MACHINE, TYPE "A"

No. 250A.	Size, 32 × 42" ..	Floor space, 26 × 42" ...	Height, 7'	Price, \$250 00
No. 250B.	" 36 × 60" ..	" " 28 × 45" ...	" 8' 6" ..	" 280 00
No. 250C.	" 42 × 60" ..	" " 32 × 49" ...	" 8' 6" ..	" 300 00
No. 250D.	" 42 × 72" ..	" " 32 × 49" ...	" 9' 6" ..	" 350 00

HALF CYLINDRICAL MACHINE, TYPE "B"

No. 251A.	Size.....	32 × 42"	Price.....	\$225 00
No. 251B.	"	36 × 60"	"	245 00
No. 251C.	"	42 × 60"	"	255 00
No. 251D.	"	42 × 72"	"	300 00

CONTINUOUS BLUE PRINT MACHINES



"Defiance" Drum Blue Print Machine
Patented

CONTINUOUS BLUE PRINT MACHINES

"Defiance" Drum Blue Print Machine

Patented

The drum is of well seasoned wood, secured to iron centres, turned on the outside to a diameter of 18" and covered with thick felt. The spindle ends are supported in brass slide blocks, adjusted by pressure screws, by means of which the drum is brought into contact with the inner surface of a glass plate, carefully bent to a true curve and bedded in a soft wooden framework. The frame carrying the glass plate can be easily removed for cleaning or renewal.

The standards are of wood or iron to suit customer's requirements. Machines with iron standards are recommended.

Driving Gear.—The drum is driven by a small electric motor, through step cone and worm reducing gear. This combination has been found to give the minimum frictional resistance and to admit of easy and reliable change of speed.

Electric Control.—When required, an additional gear is provided in the form of an adjustable resistance by which the speed of the motor can be immediately varied. This is the most effective control and strongly recommended.

The speed can be varied from 4" to 150" per minute. The time of exposure is only limited by the rapidity of the sensitized paper and the number and power of the lamps used.

Lamps.—The lamps recommended are the Zinco type. For a 32" machine two lamps are generally used, and three lamps for a 42" machine.

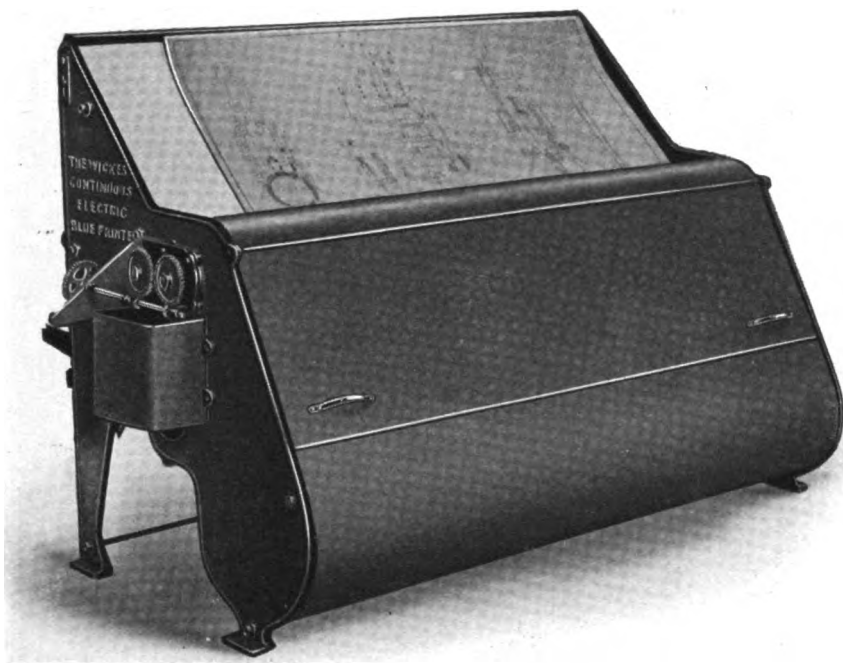
Wiring.—The machines are completely wired and include Resistance, d. p. Switches, Fuses and a length of about 9 feet of Cable with large Plug and Socket.

Testing.—Each machine is carefully tested under actual working conditions before despatch.

A special feature in conjunction with the above described machine, is the **DRY BOX**, as shown in illustration, which can be operated by the resistance of the electric lamps, or if preferred it can be heated by gas.

Price on application.

CONTINUOUS BLUE PRINT MACHINES



The Wickes Continuous Electric Blue Print Machines
(Mercury Vapor Lamps)

The most compact, simple and economical low-priced continuous machine on the market.

The total consumption of current for operating lamps and motor at 110 volts is only five amperes, which is less than one-third of the current consumed by any other blue printing machine manufactured.

In front and just below the feeding table there is a light-proof magazine which provides ample room for three or four rolls of Blue Print Paper.

Perfect contact is assured. The tension is regulated automatically. The machine is entirely self contained, requiring a floor space of only 2'-6" X 5'-0" X 30" high.

No. 252A.	Printing capacity, 48" wide.	Direct current	\$275 00
No. 252B.	Printing capacity, 48" wide.	Alternating current	290 00

In ordering, please state whether "Direct" or "Alternating" current is required.

AIR TIGHT METAL TUBES

For Preserving Paper.



No. 260.

Made of tin with well fitting covers; for keeping cut rolls of prepared Blue Print and Sepia papers dry and dark, and also well adapted for the safe keeping of valuable plans and tracings.

No. 260.	For 50-yd. rolls, 31" long.....	Each \$1 10
261.	" 37" "	" 1 25
262.	" 43" "	" 1 35
263.	" 55" "	" 2 00
264.	For 10-yd. rolls, 31" "	" 95
265.	" 37" "	" 1 00
266.	" 43" "	" 1 10
267.	" 55" "	" 1 70

PASTEBOARD TUBES



No. 268.

These tubes are made with close-fitting caps at each end, and are used for preserving 10-yard rolls of prepared paper, also for mailing and keeping drawings, tracing cloth, etc.

No. 268.	2 " diameter, 31" long.....	Each \$0 08
269.	2 " " 37" "	" 09
270.	2 " " 43" "	" 10
271.	2 1/2" " 31" "	" 10
272.	2 1/2" " 37" "	" 12
273.	2 1/2" " 43" "	" 15

HEAVY PASTEBOARD TUBES

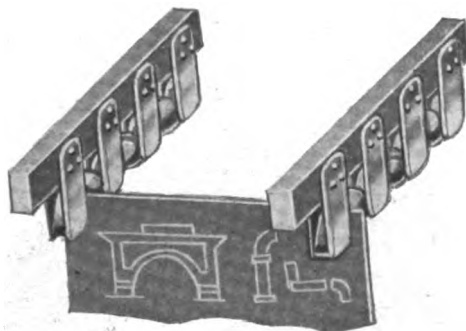


No. 275.

Made of extra heavy pasteboard, with metal screw cap on one end and fixed metal cap on the other end. They are dust-proof, light-proof, very durable, and excellent for shipping or filing drawings, tracings, etc.

No. 275.	2 " inside diameter, 32" long.....	Each \$0.30
276.	2 " " 37" "	" 35
277.	2 " " 43" "	" 40
278.	2 1/2" " 32" "	" 45
279.	2 1/2" " 37" "	" 50
280.	2 1/2" " 43" "	" 55
281.	3 1/2" " 32" "	" 60
282.	3 1/2" " 37" "	" 65
283.	3 1/2" " 43" "	" 70

DEFIANCE AUTOMATIC PRINT HANGER



Nos. 284, 288.

								Each bar
No. 284.	Defiance Automatic Print Hanger Bar	with 10 holders.....						\$1 50
285.	"	"	"	"	"	20	"	3 00
286.	"	"	"	"	"	25	"	3 75
287.	"	"	"	"	"	30	"	4 50
288.	"	"	"	"	"	35	"	5 25

We quote single bars, as it depends on the size of the print whether it requires 1 or 2 or more bars to prevent sagging of the wet print between the points of suspension.

This automatic hanger for blue prints, etc., economizes space, saves much time and labor in drying prints, will not tear the paper and avoids crumpling of the prints. The metal holders are attached to a wooden bar, each holder having a loosely jointed tongue. When a print is inserted it raises the tongue which, dropping back firmly, locks the print. To remove the print the tongue is raised by extending one finger under it. The metal holders are about $2\frac{1}{4}$ " apart, giving ample circulation of air between the suspended prints.

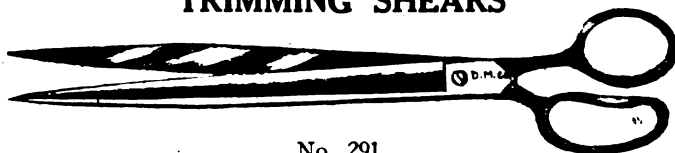
SPRING CLIPS



No. 290.

No. 290. Spring clips for suspending prints while drying.....Per doz., \$0 25

TRIMMING SHEARS

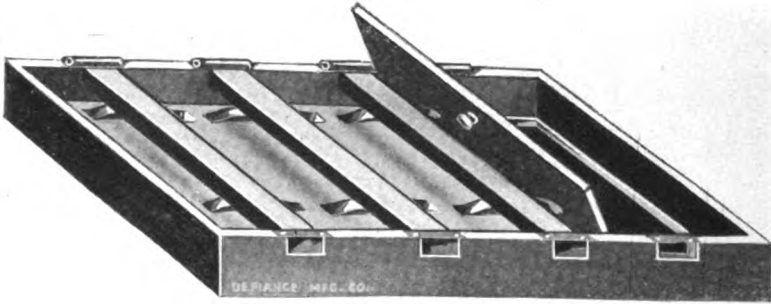


No. 291.

No. 291.	Trimming Shears,	14".....	Each	\$1 75
292	"	16".....	"	2 50
293	"	18".....	"	3 50

BLUE PRINT FRAMES

Made of superior quality Hardwood, neatly finished, with metal mountings, with or without felt cushions or polished plate glass.

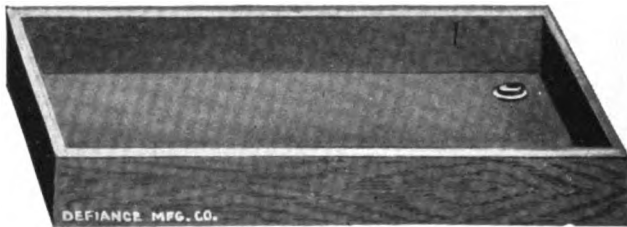


No. 295A—E.

	Size Printing Surface.	Frame Only.	With Felt Pad.	With Felt Pad and Polished Plate Glass
No. 295A.	18 × 20"	Each, \$ 6 50	\$ 7 25	\$ 9 75
295B.	20 × 24"	" 6 85	7 60	10 40
295C.	24 × 30"	" 8 80	9 90	15 25
295D.	30 × 42"	" 13 90	15 90	24 90
295E.	36 × 60"	" 22 50	25 75	43 50

Any size frame of different pattern made to order at shortest notice.

BATH TRAYS FOR BLUE PRINTS

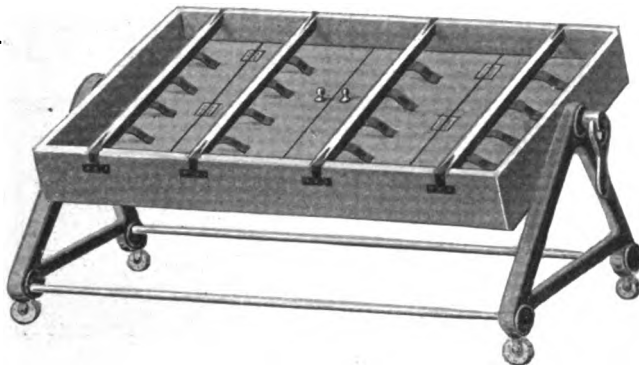


No. 296A—E.

Metal Bath Trays with drain pipe, strong wire rimmed and hardwood braces.

No. 296A.	18 × 22"	.....	Each \$ 5 90
296B.	20 × 24"	.....	" 6 65
296C.	24 × 30"	.....	" 7 75
296D.	30 × 42"	.....	" 10 00
296E.	36 × 60"	.....	" 13 00

BLUE PRINT FRAMES ON WHEEL CARRIAGES



These carriages are made of iron and are of very substantial construction. The frames are our regular style as listed, but are mounted so that they revolve in the standards of the carriage and by means of a notched wheel can be clamped at any angle to receive the rays of the sun.

Printed Surface	Complete with polished plate glass, cushion and carriage
No. 298A. 24 × 36".....	Each, \$40 00
298B. 30 × 42".....	" 45 00
298C. 36 × 48".....	" 58 25
298D. 36 × 60".....	" 68 00
298E. 42 × 60".....	" 75 00
298F. 42 × 72".....	" 89 00

TRACKS FOR BLUE PRINT FRAMES

A practical track arrangement upon which Frames on carriages may be run out of window for exposure. The rails are of angle iron.

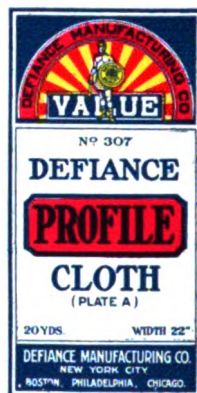
In ordering state distance from floor to top of window sill, width of window and thickness of wall.

No. 2996. Tracks for Blue Print Frames on Carriage.....Each, \$15 00

“DEFIANCE” PROFILE PAPERS AND CLOTHS



No. 300.



No. 307.

(Reduced facsimile of our labels.)

Our “Defiance” **Profile and Cross Section Papers** are printed from engraved rollers on superior quality papers. These papers are especially adapted for this purpose and are unequalled for accuracy and clearly defined engraving.

“Defiance (opaque) **Cloth** is strongly recommended for out-door use. Tracing, Profile, and Cross Section Cloth made from “Defiance” Brand.

Plate A, 4 × 20 to one inch.

CONTINUOUS.

No.	Color.	On	Engraving	50 yd.	Roll.	Yard.
No. 300	Green.	On Drawing Paper,	20" wide,	50 yd. rolls.....	\$10 00	\$0 24
300	Orange.	"	"	50 "	10 00	24
301	Green.	"	10" "	50 "	6 25	15
301	Orange.	"	10" "	50 "	6 25	15
302	Green.	Mounted on Muslin,	20" "	20 "	10 00	60
302	Orange.	"	20" "	20 "	10 00	60
303	Green.	"	10" "	20 "	6 75	40
303	Orange	"	10" "	20 "	6 75	40
304	Green.	On Defiance Cloth,	20" "	20 "	10 00	60
304	Orange,	"	20" "	20 "	10 00	60
305	Orange.	On Tracing Paper,	20" "	50 "	10 00	24
306	Orange.	"	10" "	50 "	6 25	15
307	Orange.	On Tracing Cloth,	20" "	20 "	12 50	75

Samples of Profile and Cross Section Papers and Cloths mailed on application, or general Sample Book for 15 cents.

DEFIANCE PROFILE PAPERS AND CLOTHS

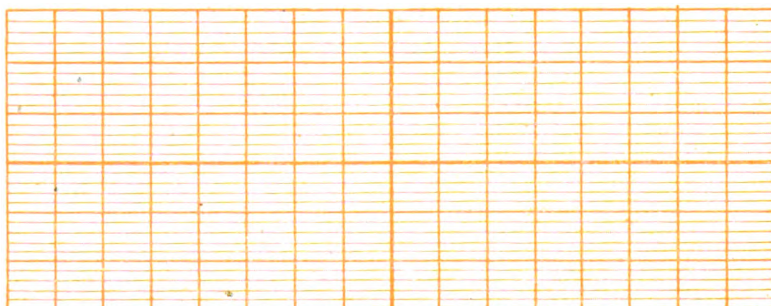


Plate B, 4 × 30 to one inch.

CONTINUOUS.

No.		Engraving	Roll.	Yard.
No. 308	Green, On Drawing Paper, 20" wide, 50 yd. rolls.....	20" " 50	\$10 00	\$0 24
308	Orange. " " " 20" " 50	" " 50	10 00	24
309	Green. " " " 9" " 50	" " 50	6 25	15
309	Orange. " " " 9" " 50	" " 50	6 25	15
310	Green. Mounted on Muslin, 20" " 20	" " 20	10 00	60
310	Orange. " " " 20" " 20	" " 20	10 00	60
311	Green. " " " 9" " 20	" " 20	6 75	40
311	Orange. " " " 9" " 20	" " 20	6 75	40
312	Green. On Defiance Cloth , 20" " 20	" " 20	10 00	60
312	Orange. " " " 20" " 20	" " 20	10 00	60
313	Orange. On Tracing Paper , 20" " 50	" " 50	10 00	24
314	Orange. " " " 9" " 50	" " 50	6 25	15
315	Orange. On Tracing Cloth , 20" " 20	" " 20	12 50	75

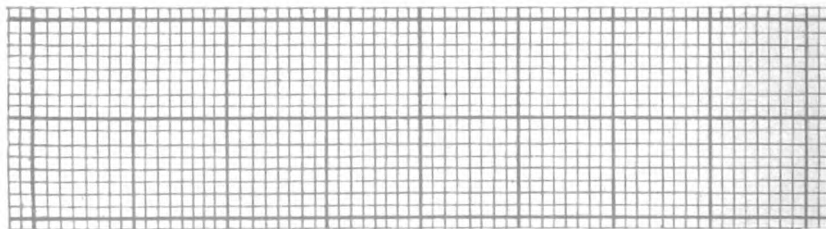
Millimeter.

CONTINUOUS.

No.		Engraving	Roll.	Yard.
No. 316	Green. On Drawing Paper, 50 cm. wide, 50 yd. rolls...	50 " 50	\$10 00	\$0 24
316	Orange. " " " 50 " 50	" " 50	10 00	24
317	Green. Mounted on Muslin, 50 " 20	" " 20	10 00	60
317	Orange. " " " 50 " 20	" " 20	10 00	60
318	Orange. On Tracing Paper , 50 " 50	" " 50	10 00	24
319	Orange. On Tracing Cloth , 50 " 20	" " 20	12 50	75

Samples of Profile and Cross Section Papers and Cloths mailed on application, or general Sample Book for 15 cents.

CONTINUOUS.					Roll.	Yard.
No.	Color.	Material.	Size.	Quantity.	Price.	Price.
320	Green.	On Drawing Paper,	20" wide,	50 yd. rolls.	\$10 00	\$0 24
320	Orange.	" " "	" " "	" " "	10 00	24
321	Green.	Mounted on Muslin,	20" " "	" " "	10 00	60
321	Orange.	" " " "	" " " "	" " "	10 00	60
322	Green.	On Defiance Cloth,	20" " "	" " "	10 00	60
322	Orange.	" " " "	" " " "	" " "	10 00	60
323	Orange.	On Tracing Paper,	20" " "	" " "	10 00	24
324	Orange.	On Tracing Cloth,	20" " "	" " "	12 50	75
SHEETS.					Quire.	Sheet.
No. 325	Green.	On Ledger Paper, engraving	16 × 20"	.....	3 50	0 20
325	Orange.	" " " "	16 × 20"	.....	3 50	20
326	Orange.	On Tracing Paper,	16 × 20"	.....	3 50	20



CONTINUOUS.						Roll.	Yard.
No. 328 Green.	On Drawing Paper,	Engraving 20" wide,	50 yd.	rolls.....	\$10 00	\$0 24	
328 Orange.	" " "	20"	50 "	.....	10 00	24
329 Green.	Mounted on Muslin,	20" "	20 "	.....	10 00	60
329 Orange.	" " "	20" "	20 "	.....	10 00	60
SHEETS.							Sheet.
No. 330 Green.	On Ledger Paper,	engraving	16 × 21"	.....	3 50	0 20
330 Orange.	" " "	"	16 × 21"	.....	3 50	20
331 Orange.	On Tracing Paper,	"	16 × 21"	.....	3 50	20

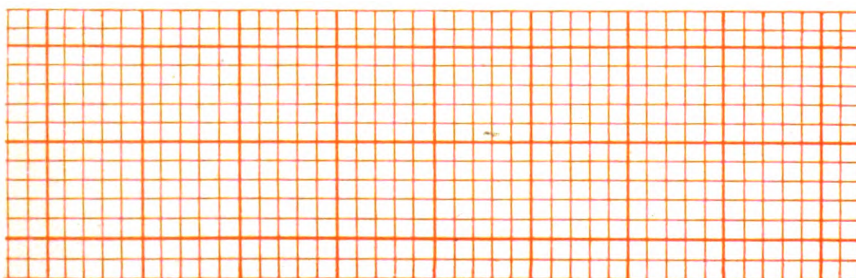
44

"DEFIANCE" CROSS SECTION PAPERS

IN SHEETS ONLY.

Nos. 340-341. 8×8 to one inch. Every fifth line heavy. Sheets only.

		Quire.	Sheet.
No. 340 Green. On Ledger Paper, engraving	$16\frac{1}{2} \times 21\frac{1}{4}$ "	\$3 50	\$0 20
340 Orange. " " "	$16\frac{1}{2} \times 21\frac{1}{4}$ "	3 50	20
341 Orange. On Tracing Paper , " "	$16\frac{1}{2} \times 21\frac{1}{4}$ "	3 50	20



Nos. 345-346. 5×5 to $\frac{1}{2}$ inch. Sheets only.

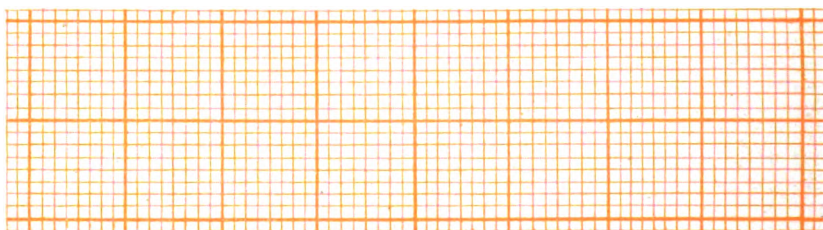
		Quire.	Sheet.
No. 345 Green. On Ledger Paper, engraving	16×20 "	\$3 50	\$0 20
345 Orange. " " "	16×20 "	3 50	20
346 Orange On Tracing Paper , " "	16×20 "	3 50	20

No. 350. 12×12 to one inch. Sheets only.

		Quire.	Sheet.
No. 350 Green. On Ledger Paper, engraving	16×20 "	\$3 50	\$0 20

Samples of Cross Section Papers mailed on application, or general Sample Book for 15 cents.

CONSTRUCTORS' CROSS SECTION PAPERS



Nos. 351-351J. 10 × 10 to $\frac{1}{2}$ inch. Every fifth line heavy.

						100 Sheets.	Quire.
No. 351.	Engraving	5 × 7 "	on drawing paper, green only,			\$0 90	\$0 25
351A.	"	5 × 7 "	tracing	"	orange "	90	25
351B.	"	5 × 7 $\frac{1}{2}$ "	drawing	"	green "	90	25
351C.	"	5 × 7 $\frac{1}{2}$ "	tracing	"	orange "	90	25
351D.	"	7 × 10 "	drawing	"	green "	1 20	30
351E.	"	7 × 10 "	tracing	"	orange "	1 20	30
351F.	"	7 $\frac{1}{2}$ × 10 "	drawing	"	green "	1 20	30
351G.	"	7 $\frac{1}{2}$ × 10 "	tracing	"	orange "	1 20	30
351H.	"	10 × 15 "	drawing	"	green "	2 40	60
351J.	"	10 × 15 "	tracing	"	orange "	2 40	60

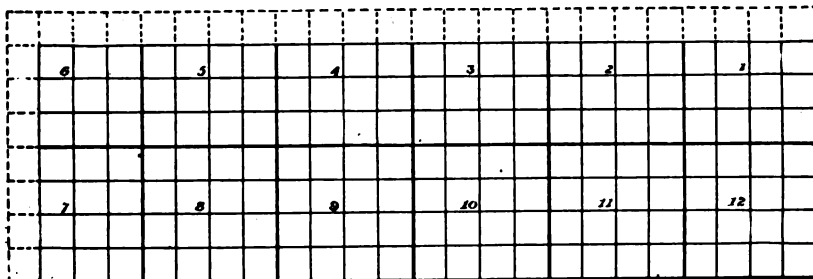
No. 352-352C. 20 × 20 to one inch. Every tenth line heavy.

						100 Sheets.	Quire.
No. 352.	Engraving	5 × 7 "	on drawing paper, green only,			\$0 90	\$0 25
352A.	"	5 × 7 "	tracing	"	orange "	90	25
352B.	"	7 × 10 "	drawing	"	green "	1 20	30
352C.	"	7 × 10 "	tracing	"	orange "	1 20	30

Nos. 353A-353B. 5 × 5 to one inch.

						100 Sheets.	Quire.
No. 353A.	Engraving	8 × 10 "	on drawing paper, green only,			\$1 75	\$0 50
353B.	"	8 × 10 "	tracing	"	orange "	1 75	50

TOWNSHIP PAPERS

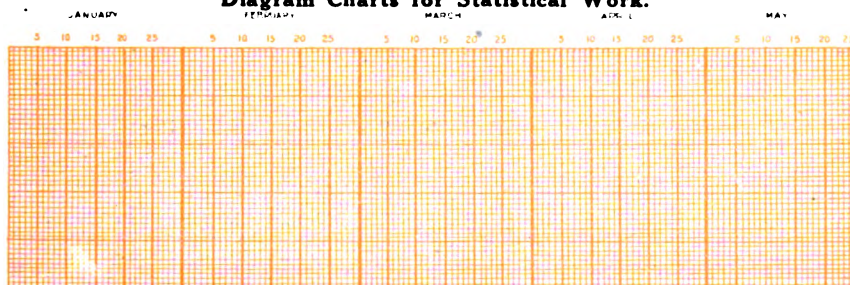


Nos. 354A-354B.

No. 354A. Engraving 6×6 " scale 1" to 1 mile, black only, 354B. " 12×12 " " 2" " 1 "	Quire. \$0 75 1 50	Sheet. \$0 05 10
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RECORD SHEETS

Diagram Charts for Statistical Work.



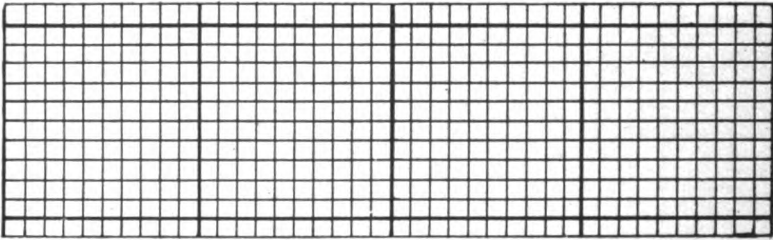
Nos. 355A-355B.

No. 355A. 7×12 " on drawing paper, green only..... 355B. 7×12 " " tracing " orange "	100 Sheets. \$4 50 4 50	Quire. \$1 25 1 25
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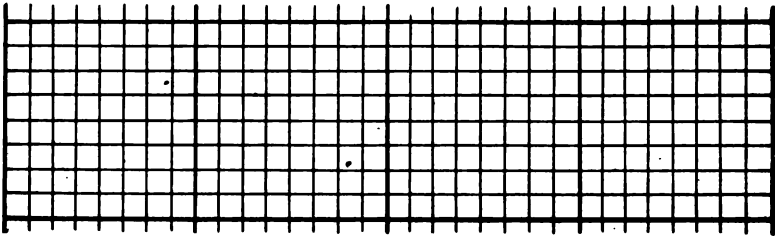
ISOMETRIC DRAWING PAPER

No. 356A. Ruled in green, in 356B. " " " " 356C. " " " "	Nos. 356A-356C. sheets 12×18 ".....Per Quire, \$0 75 pads of 40 sheets, 6×9 ".....Each, 30 " " 40 " 9×12 "....." 60
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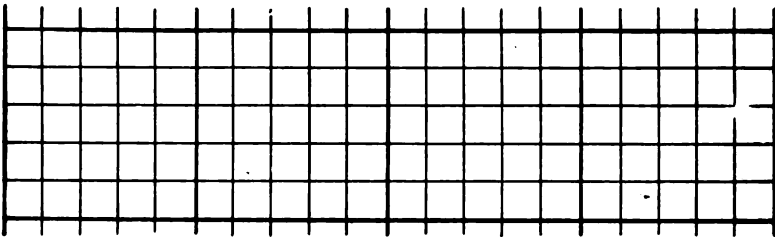
"RULED CROSS SECTION PAPERS"



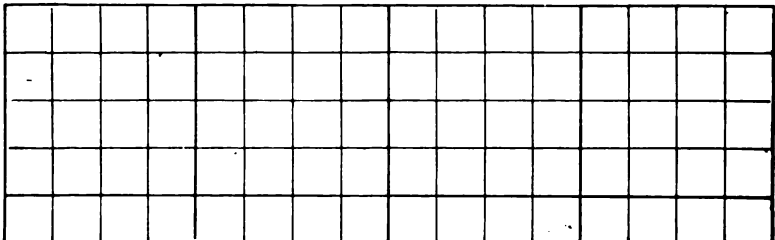
No. 357. In sheets, 16×21 " ruled in blue, 10×10 to 1".....Per Quire, \$1 00



No. 358. In sheets, 16×21 " ruled in blue, 8×8 to 1".....Per Quire, \$1 00



No. 359. In sheets, 16×21 " ruled in blue, 5×5 to 1".....Per Quire, \$1 00



No. 360. Topographical Paper, 16×21 ", 400' to 1", ruled in blue and red.....Per Quire, \$1 00

The Ruled Cross Section Papers are not as reliable as the Printed
Cross Section Papers.

Samples of Cross Section Papers mailed on application, or general Sample Book for 15 cents.

LOGARITHMIC PAPER

	No. 361A.	Per doz.
No. 361A.	Engraving $10 \times 10''$ on tracing paper, green only 5" base....	\$0 75
361B.	" $10 \times 10''$ " " " " 10" "	75

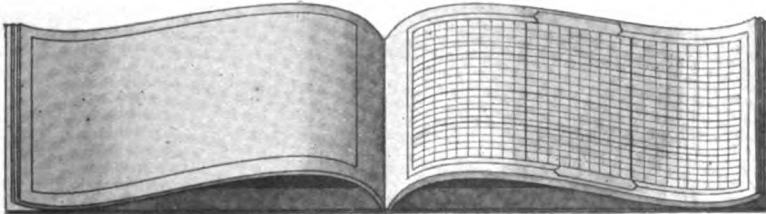
Logarithmic Paper is so ruled that the scales in each direction are logarithmic instead of uniform, as on other cross section papers; the numbers and divisions marked are placed at such points as to make their distances from the origin proportional to the logarithm of such numbers instead of to the numbers themselves. By means of this paper logarithmic operations are performed graphically, without reference to the logarithms themselves. Many hydraulic and other engineering computations are facilitated by its use, and various relationships (sizes of tie-bars, shafts, etc., in terms of varying load, or the inverse; circumference and diameters of circles in terms of their radii or diameters, or the inverse; weights of the series of bodies of the same substance and form, but of varying size, or the inverse, etc., etc.) can be represented.

CROSS SECTION BLOCKS

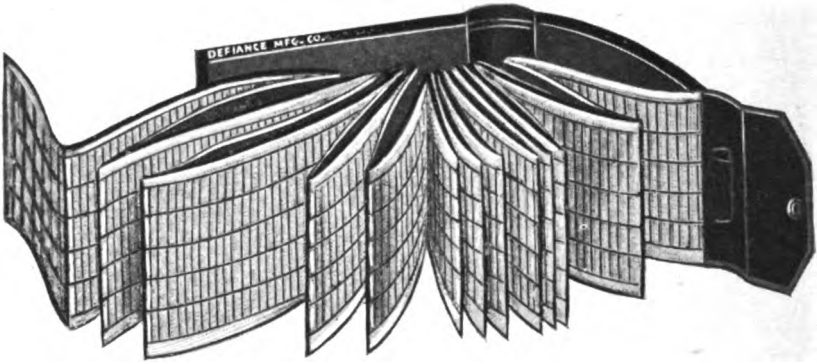
	Of Printed Cross Section Paper.	Each
No. 370.	$5 \times 7''$, 10×10 to $1''$, 24 sheets, printed in green.....	\$0 75
371.	$5 \times 7''$, 8×8 " $1''$, 24 " " " "	75
372.	$7 \times 10''$, 10×10 " $1''$, 24 " " " "	1 25
373.	$7 \times 10''$, 8×8 " $1''$, 24 " " " "	1 25

	Of Ruled Cross Section Paper.	
No. 374.	$8 \times 10''$, 10×10 to $1''$, ruled in blue, 24 sheets.....	\$0 50
375.	$8 \times 10''$, 8×8 " $1''$, " " " " 24 "	50

DUNHAM'S PLAT AND PROFILE BOOK



	No. 376.	
No. 376.	Dunham's Plat and Profile Book.....	Each, \$1 00



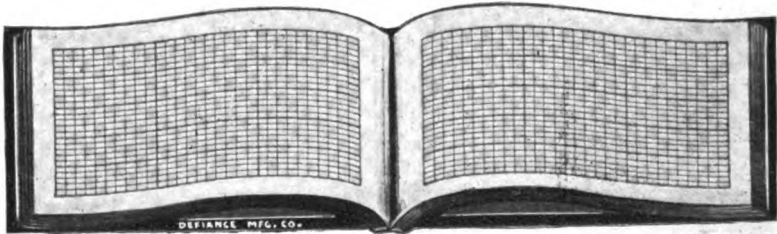
No. 378

Bound in Flexible Morocco Covers.

These books are folded like a map to replace the continuous rolls of profile paper, and the pages are mounted on muslin.

Each leaf, or two pages facing, contains six thousand feet—a "Section" as generally laid out for the construction of a road. The paper lays smooth and is of extra fine quality.

No. 378.	Plate A.	4×20 to $1''$.	$5\frac{1}{2} \times 8''$.	Printed in green.
	12	25	50	100 miles
	Each, \$2 00	3 20	5 20	9 40
No. 380.	Plate B.	4×30 to $1''$.	$4\frac{3}{4} \times 8''$.	Printed in green.
	12	25	50	100 miles
	Each, \$2 00	3 20	5 20	9 40



No. 382

Stiff Morocco Covers.

No. 382.	Plate A.	4×20 to $1''$.	Size of Book, $7 \times 10''$.	Printed in green.
		25	50	100 leaves.
	Bound in Morocco.....	Each, \$1 75	2 25	3 00
No. 384.	Plate B.	4×30 to $1''$.	Size of Book, $5\frac{1}{2} \times 9\frac{1}{4}''$.	Printed in green.
		25	50	100 leaves.
	Bound in Morocco.....	Each, \$1 75	2 25	3 00

BLUE AND BLACK PRINTS

LITHOGRAPHIC REPRODUCTIONS

QUALITY VALUE
SERVICE

Within the year, THE DEFIANCE MANUFACTURING COMPANY has acquired the largest plant in America for the reproduction of Engineers and Architects drawings and tracings in blue or black prints or lithographic reprints, and by continuing this plant under the same management as heretofore, are enabled to give unusual and special attention and personal supervision to all work entrusted to them, and prompt service is guaranteed.

REPRODUCTIONS ON TRACING CLOTH

White Linen or Paper

BLUE AND BLACK PRINTS ON PAPER OR CLOTH

SPECIAL QUOTATIONS ON LARGE QUANTITIES

By using Tracing Cloth a tracing can be made, from which prints can be taken with equal brilliance to the original, thereby making it possible to save the original tracing.

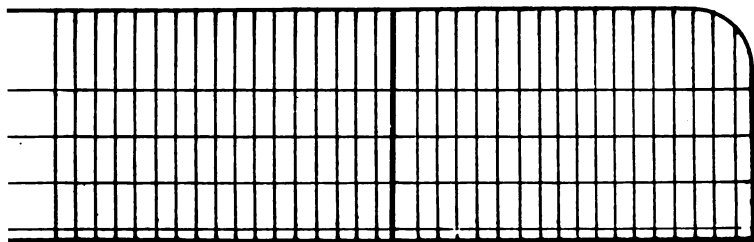
ENGINEERS'

		Each	Dozen
No. 400.	Field Book, $4\frac{1}{2} \times 7\frac{1}{2}$ ", 80 leaves.....	\$0 55	\$5 00
401.	" " Like No. 400, but with Tables.....	65	6 50

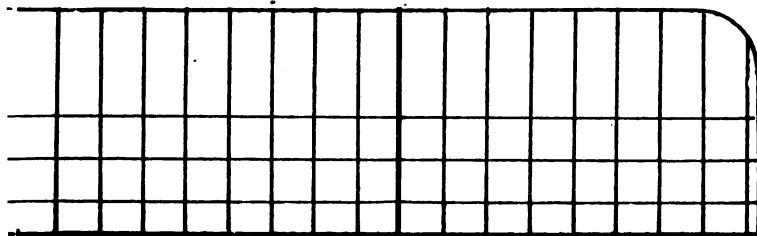
		Each	Dozen
No. 404	Field Book, $4\frac{1}{2} \times 7\frac{1}{2}$ ", 80 leaves.....	\$0 55	\$5 50
405.	" " Like No. 404, but with Tables.....	65	6 50

		Each	Dozen
No. 408.	Transit Book, $4\frac{1}{2} \times 7\frac{1}{2}$ ", 80 leaves.....	\$0 55	\$5 50
409.	" " Like No. 408, but with Tables.....	65	6 50

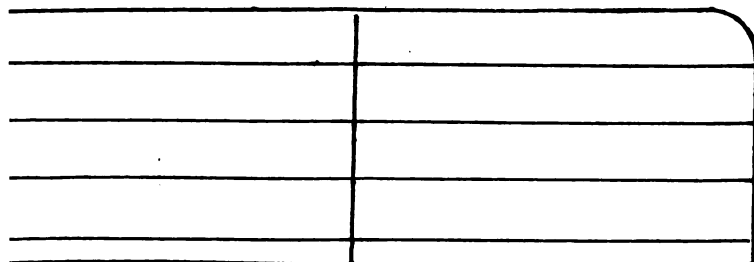
FIELD BOOKS



		Each	Dozen
No. 402.	Field Book, $4\frac{1}{4} \times 7''$, 60 leaves.....	\$0 50	\$5 00
403	" " Like No. 402, but with Tables.....	55	5 50



		Each	Dozen
No. 406.	Field Book, $4\frac{1}{4} \times 7''$, 60 leaves.....	\$0 50	\$5 00
407.	" " Like No. 406, but with Tables.....	55	5 50



		Each	Dozen
No. 410.	Transit Book, $4\frac{1}{4} \times 7''$, 60 leaves.....	\$0 50	\$5 00
411.	" " Like No. 410, but with Tables.....	55	5 50

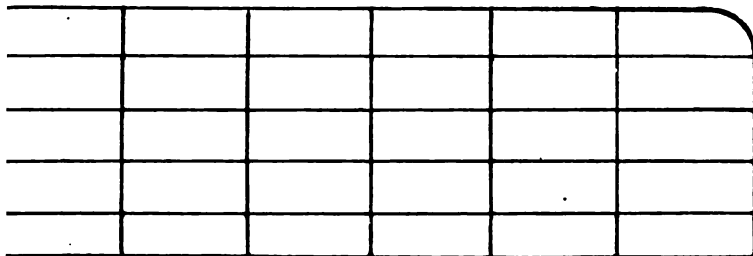
ENGINEERS'

		Each	Dozen
No. 412.	Level Book, $4\frac{1}{2} \times 7\frac{1}{2}$ ", 80 leaves.....	\$0 55	\$5 50
413.	" " Like No. 412, but with Tables.....	65	6 50

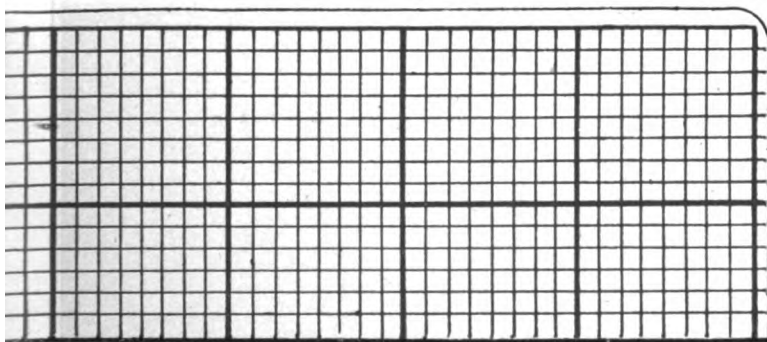
[illegible]

	Each	Dozen
No. 416. Cross Section Book, $4\frac{1}{2} \times 7\frac{1}{2}$ ", 80 leaves, ruled 8×8 to 1".....	\$0 60	\$6 00
417. Cross Section Book, Like No. 416, but with Tables....	70	7 00

FIELD BOOKS



		Each	Dozen
No. 414.	Level Book, $4\frac{1}{2} \times 7$ ", 60 leaves.....	\$0 50	\$5 00
415.	" " Like No. 414, but with Tables.....	55	5 50



		Each	Dozen
No. 418.	Cross Section Book, $6\frac{1}{2} \times 8\frac{1}{2}$ ", 80 leaves, ruled 8×8 to 1".....	\$0 90	\$ 9 00
419.	Cross Section Book, Like No. 418, but with Tables....	1 00	10 00

ENGINEERS'

<i>SECTION.</i>									
<i>STA</i>	<i>ELEV.</i>	<i>GRADE</i>	<i>CUT OR FILL.</i>						
			<i>LEFT.</i>	<i>C.</i>	<i>RIGHT.</i>				

Each Dozen

No. 420. Earthworks Books, $5 \times 7\frac{1}{4}$ ", 80 leaves, printed headings. \$0 85 \$8 50

No. 422. Topographical Book, 5×8 ", 80 leaves, plain.....

FIELD BOOKS

AREAS				CUBIC YDS.		REMARKS
CAVATION		EMBANKMT		EXCAV.	EMBANK	

	Each	Dozen
No. 421. Earthworks Books, Like No. 420, but with Tables.....	\$0 95	\$9 50

A large rectangular grid with rounded corners, consisting of 15 columns and 10 rows of squares, intended for drawing a picture.

	Each	Dozen
.....	\$1 20	\$12 00

"STANDARD"

BLANKS FOR THE BUILDING TRADES

BLANK FORM SPECIFICATION AND REMINDER

No. 450. **"STANDARD" BLANK FORMS OF SPECIFICATIONS** consisting of fourteen sheets in strong manila cover, containing the following blank forms:

PREAMBLE,	GLAZIERS',	PLUMBERS, Gas Fitters and Sewers,
MASONS' CUT STONE	GALVANIZED IRON,	AGREEMENT between Owner and Contractor (with Bond).
PLASTERERS',	IRON (Structural),	CONTRACTORS' STATEMENT,
CARPENTERS',	HEATING, Steam or Hot Water.	ARCHITECTS' REMINDERS (on inside cover).
PLUMBERS',	HEATING, Furnace,	
PAINTERS',	ELECTRIC WIRING,	

Single Sets.....	\$0 25
Dozen "	2 50
100 "	17 50

SEPARATE BLANK FORMS

No. 450A. Building Contract	Per doz. 20;	Per 100, \$1 25
450B. Building Contract with bond	" 25;	" 1 75
450C. Contractors' Statement	" 25;	" 1 75
450D. Mechanics' Lien Notice	" 25;	" 1 75
450E. Waiver of Lien	" 25	" 1 75

ARCHITECTS' CERTIFICATE BOOK



No. 460

- | | | |
|----------|--|-----------------|
| No. 460. | Architects' Certificate Book of 100 certificates and sheets..... | Each, \$1 50 |
| 460. | Architects' Certificate Book of 100 certificates and sheets, printed with name and address..... | " 2 25 |
| 460. | Architects' Certificate Book of 100 certificates and sheets, printed with name and address. 3 books.... | " 6 00 |

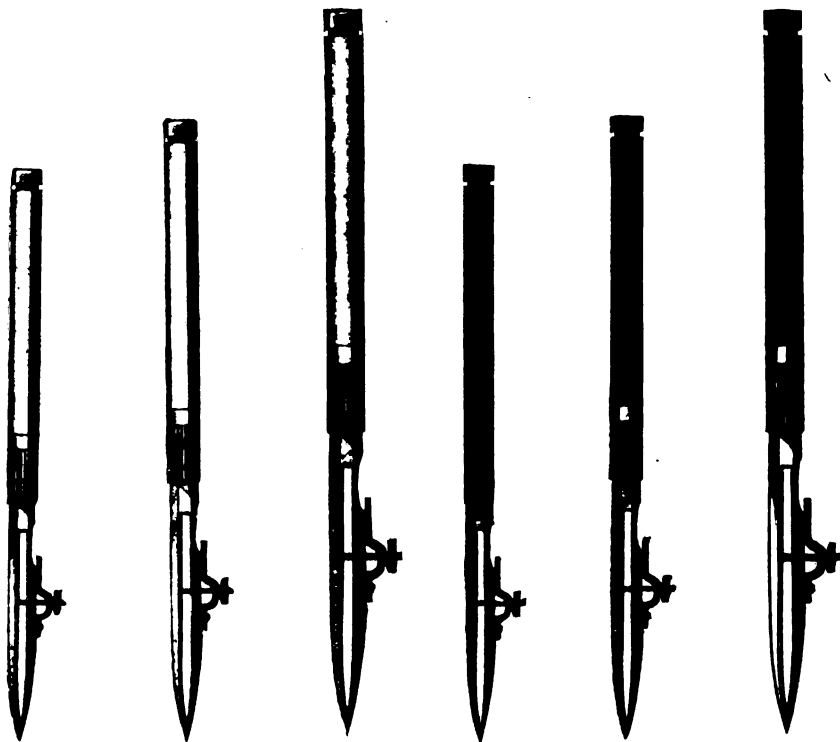
SPECIFICATION PAPER

- | | | |
|----------|--|------------------|
| No. 462. | Typewriter Paper , thin, 8 × 13"..... | Per ream, \$1 00 |
| 463. | " " medium 8 × 13",..... | " 1 20 |

DEFIANCE INSTRUMENTS

High Grade

English Tool Steel



No. 600

No. 601

No. 602

No. 603

No. 604

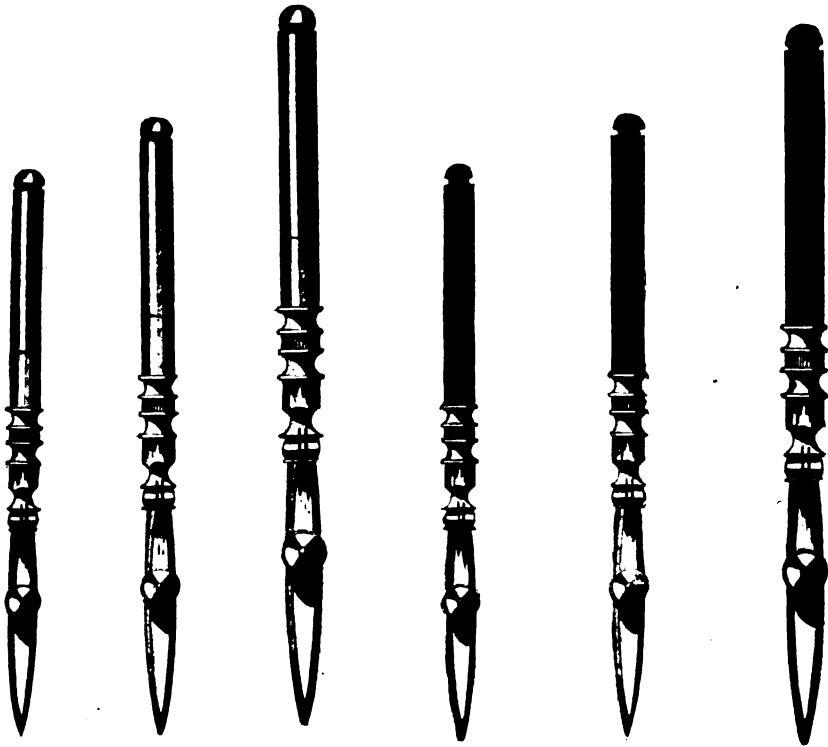
No. 605

No. 600.	Ruling Pen, 4 $\frac{1}{4}$ ", with release spring, ivory handle...								Each, \$0 90
601.	"	"	5 "	"	"	"	"	...	" 1 00
602.	"	"	5 $\frac{1}{2}$ ",	"	"	"	"	...	" 1 15
603.	"	"	4 $\frac{1}{4}$ ",	"	"	"	ebony handle...		" 85
604.	"	"	5 "	"	"	"	"	...	" 95
605.	"	"	5 $\frac{1}{2}$ ",	"	"	"	"	...	" 1 10

DEFIANCE INSTRUMENTS

High Grade

Finest English Steel



No. 606 No. 607 No. 608 No. 609 No. 610 No. 611

No. 606.	Ruling Pen, 4¼",	with new hinge, point, ivory handle...	Each,	\$1 75
607.	"	" 5 ", " " " " " " " ... "		2 00
608.	"	" 5½", " " " " " " " ... "		2 25
609.	"	" 4¼", with hinge, point and pin, ebony handle	"	1 50
610.	"	" 5 ", " " " " " " "	"	1 80
611.	"	" 5½", " " " " " " "	"	1 95

DEFIANCE INSTRUMENTS

High Grade

Finest Quality English Steel



No. 612



No. 613



No. 614



No. 615



No. 616



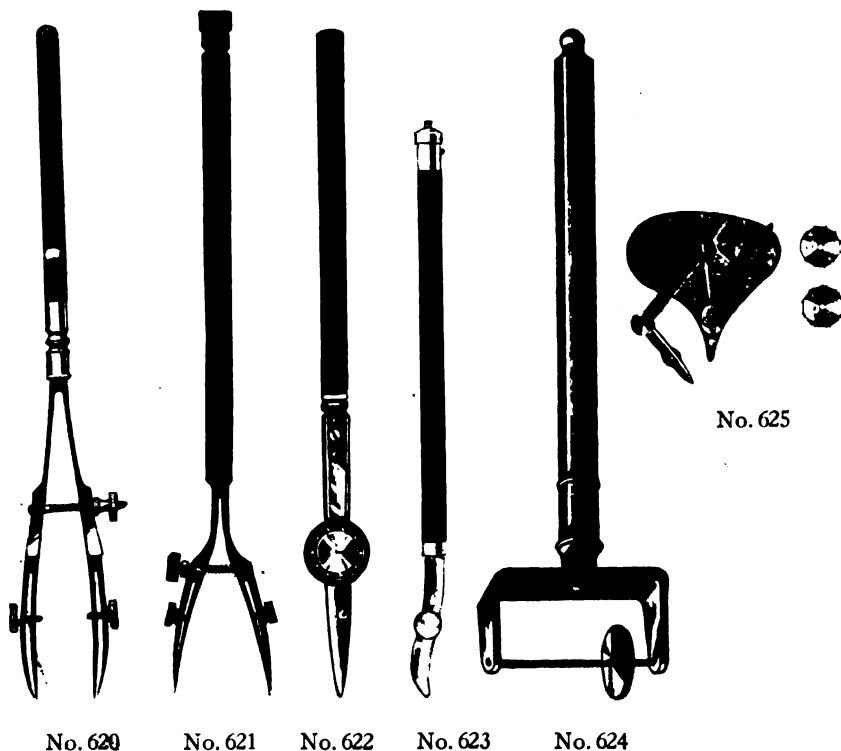
No. 617

No. 612.	Swedish Detail Pen, 5", ebony handle.....	Each, \$1 50
613.	" " " 6", " "	" 1 65
614.	" " " 7", " "	" 1 80
615.	" " " 5", aluminum handle.....	" 1 75
616.	" " " 6", " "	" 2 00
617.	" " " 7", " "	" 2 25

DEFIANCE INSTRUMENTS

High Grade

Finest Quality English Steel

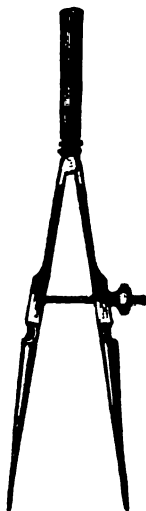


No. 620.	Border Pen, 6", ebony handle.....	Each, \$3 50
622.	Ruling " 5½", with graduated thumb screw, metal handle.....	" 1 80
623.	Curve Pen, 5", rod in hollow handle, with screw at upper end to set pen firm for straight lines or loose for curves, with metal handle.....	" 1 50
624.	Opisometer, ivory handle, for measuring curved lines.....	" 1 75
625.	Dotting Instrument, with 3 wheels, in case.....	" 4 00
621.	Railroad " 5", " "	" 4 00

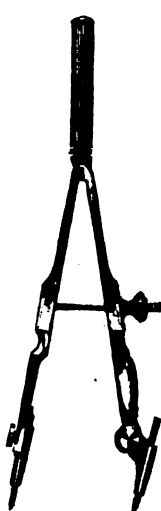
DEFIANCE INSTRUMENTS

High Grade

Rolled German Silver and Best English Tool Steel



No. 626



No. 627

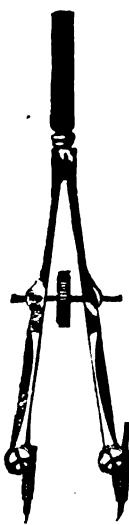


No. 628

- | | | | |
|----------|--|-------------------|---------------|
| No. 626. | Steel Spring Bow Dividers, $\frac{3}{4}$ " | metal handle..... | Each, \$1 50 |
| 627. | " " " Pencil, $\frac{3}{4}$ " | " " | " 1 75 |
| 628. | " " " Pen, $\frac{3}{4}$ " | " " | " 1 75 |
| 629. | Set of Bows, Nos. 626, 627 and 628, in case..... | | Per set, 5 50 |



No. 630



No. 631



No. 632

- | | | | |
|----------|--|-------------------------|---------------|
| No. 630. | Steel Spring Bow Dividers, center wheel, $\frac{3}{4}$ " | metal handle..... | Each, \$1 50 |
| 631. | " " " Pencil, " " | $\frac{3}{4}$ " " | " 1 75 |
| 632. | " " " Pen, " " | $\frac{3}{4}$ " " | " 1 75 |
| 633. | Set of Bows, Nos. 630, 631 and 632, in case..... | | Per set, 5 50 |

DEFIANCE INSTRUMENTS

High Grade

Rolled German Silver and Best English Tool Steel



No. 640



No. 641



No. 642



No. 643

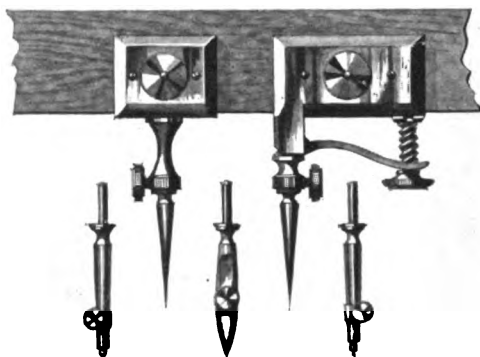


No. 640.	Plain Dividers, 6", with straightening device.....	Each,	\$2.25
641.	Hairspring Divider, 6", with straightening device.....	"	3 00
642.	Compasses, 4½", with fixed needle point, pen and pencil point and straightening device.....	"	3 50
643.	Compasses, 6", with fixed needle point, pen and pencil point, lengthening bar and straightening device.....	"	5 25

DEFIANCE INSTRUMENTS

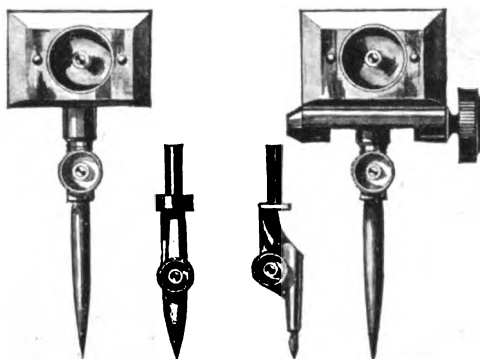
High Grade

Rolled German Silver and Best English Tool Steel



No. 644.

- No. 644. Beam Compasses, to fit on any straight edge, with two steel points, pencil, pen and needle point and micrometer adjustment.....Each, \$7 50
645. Beam Compass, No. 644, in morocco case..... " 8 50



No. 646.

- No. 646. Beam Compasses, with two steel points, pen, pencil and needle point and micrometer adjustment.....Each, \$7 75
647. Beam Compasses, No. 646, in morocco case..... " 8 75

DEFIANCE INSTRUMENTS

High Grade

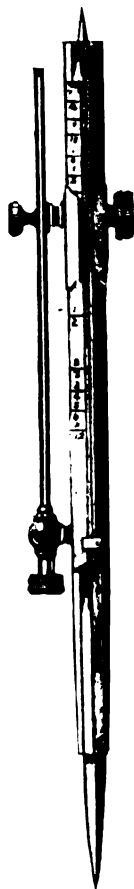
PROPORTIONAL DIVIDERS



No. 649



No. 650



No. 651

- No. 649. Proportional Dividers, $7\frac{1}{2}$ ", with exchangeable points, finely graduated for lines and circles.....Each, \$10 00
650. Proportional Dividers, $8\frac{1}{2}$ ", with exchangeable points, finely graduated for lines and circles..... " 12 00
651. Proportional Dividers, 9", with rack movement, exchangeable and adjustable points, finely graduated for lines and circles..... " 15 00

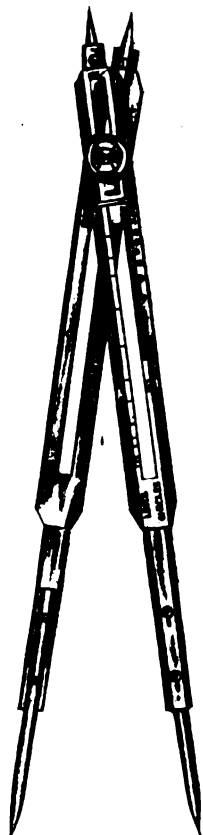
Morocco Cases, silk velvet lined:

	No. 649.	No. 650.	No. 651.
Each.....	\$0 75	85	1 00

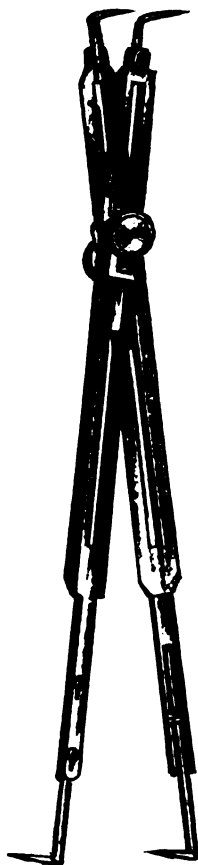
DEFIANCE INSTRUMENTS

High Grade

PROPORTIONAL DIVIDERS



No. 652



No. 653



No. 654

- | | | |
|----------|--|---------------|
| No. 652. | Standard Proportional Dividers, 10", with rack movement, exchangeable and adjustable points. In polished case, with table of settings..... | Each, \$16 50 |
| 653. | Standard Proportional Dividers, 10", points bent at right angles, in opposite directions, for easier manipulation and closer contact with drawing paper, with rack movement, exchangeable and adjustable points. In polished case, with table of settings..... | " 20 00 |
| 654. | Proportional Dividers, 9", with micrometer adjustment and exchangeable points. Finely graduated for lines, circles, planes and solids..... | " 16 00 |

DEFIANCE INSTRUMENTS

High Grade

Rolled German Silver and Highest Quality English Tool Steel



No. 675.

No. 675. Containing:

No. 602 Ruling Pen, 5½", ebony handle. No. 628 Steel Spring Bow Pen, 3½", metal handle. No. 643 Compasses, 6", with fixed needle point, pen and pencil point, lengthening bar and straightening device.

In pocket-book case. Per set..... \$10 50



No. 676.

No. 676. Containing:

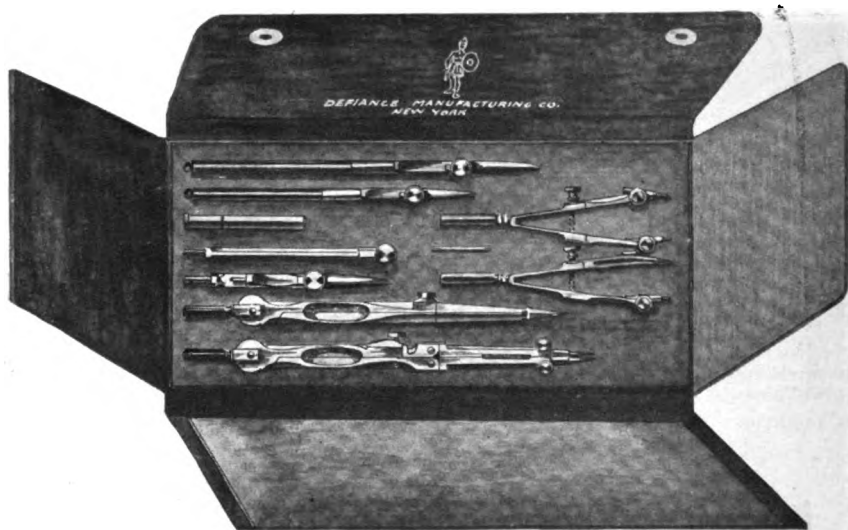
No. 602 Ruling Pen, 5½", ebony handle. No. 627 Steel Spring Bow Pencil, 3½", metal handle. No. 628 Steel Spring Bow Pen, 3½", metal handle. No. 643 Compasses, 6", with fixed needle point, pen, pencil point, lengthening bar and straightening device.

In pocket-book case. Per set..... \$12 00

DEFIANCE INSTRUMENTS

High Grade

Rolled German Silver and Finest Quality English Tool Steel



No. 677.

No. 677. Containing:

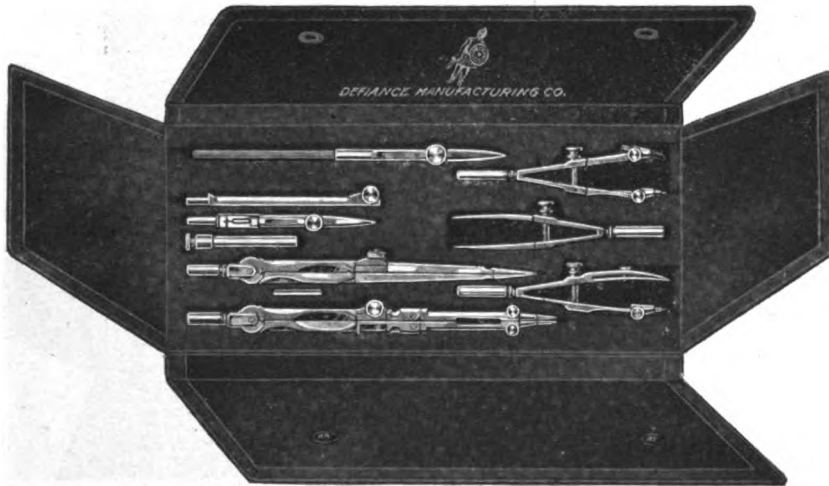
No. 600 Ruling Pen, $4\frac{1}{2}$ ", ebony handle. No. 602 Ruling Pen, $5\frac{1}{2}$ ", ebony handle. No. 627 Steel Spring Bow Pencil, $3\frac{1}{2}$ ", metal handle. No. 628 Steel Spring Bow Pen, $3\frac{1}{2}$ ", metal handle. No. 641 Hairspring Dividers, 6", with straightening device. No. 643 Compass, with fixed needle point, pen and pencil point, lengthening bar and straightening device.

In pocket book case. Per set..... \$15 25

DEFIANCE INSTRUMENTS

High Grade

Rolled German Silver and Finest Quality English Tool Steel



No. 678.

No. 678. Containing:

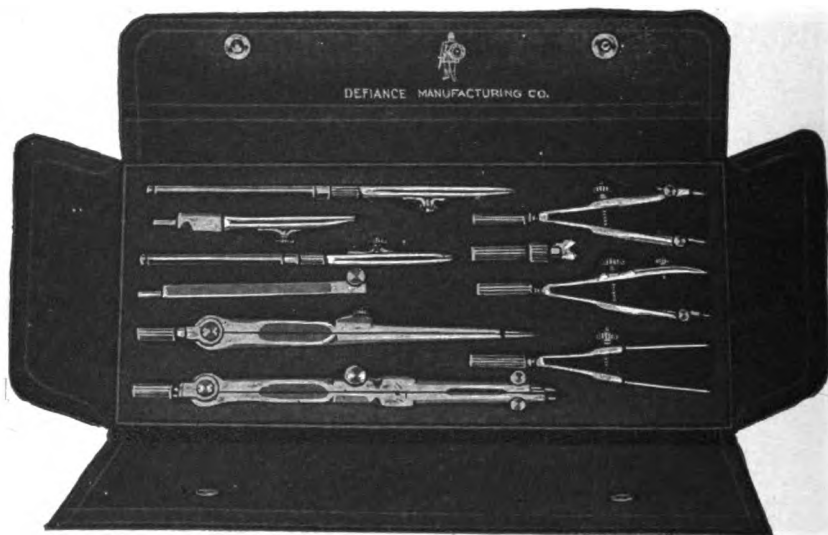
No. 602 Ruling Pen, $5\frac{1}{2}$ ", ebony handle. No. 626 Steel Spring Bow Dividers, $3\frac{1}{2}$ ", metal handle. No. 627 Steel Spring Bow Pencil, $3\frac{1}{2}$ ", metal handle. No. 628 Steel Spring Bow Pen, $3\frac{1}{2}$ ", metal handle. No. 641 Hairspring Dividers, 6", with straightening device. No. 643 Compass, with fixed needle point, pen and pencil point, lengthening bar and straightening device.

In pocket book case. Per set..... \$16 00

DEFIANCE INSTRUMENTS

High Grade

Rolled German Silver and Finest Quality English Tool Steel



No. 680.

No. 680. Containing:

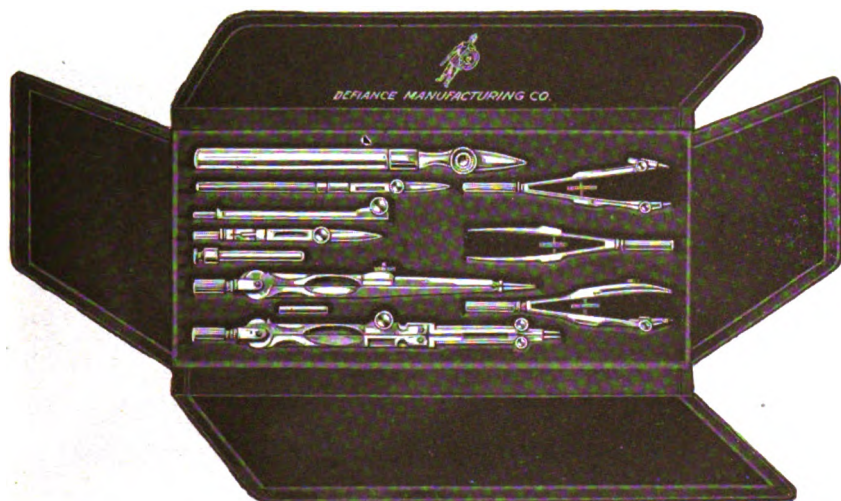
No. 600 Ruling Pen, $4\frac{1}{2}$ ", ebony handle. No. 602 Ruling Pen, $5\frac{1}{2}$ ", ebony handle. No. 626 Steel Spring Bow Dividers, $3\frac{1}{4}$ ", metal handle. No. 627 Steel Spring Bow Pencil, $3\frac{1}{2}$ ", metal handle. No. 628 Steel Spring Bow Pen, $3\frac{1}{4}$ ", metal handle. No. 641 Hairspring Divider, 6", with straightening device. No. 643 Compasses, 6", with fixed needle point, pen and pencil point, lengthening bar and straightening device.

In pocket book case. Per set..... \$17 50

DEFIANCE INSTRUMENTS

High Grade

Rolled German Silver and Finest Quality English Tool Steel



No. 681.

No. 681. Containing:

No. 600 Ruling Pen, 4½", ebony handle. No. 616 Swedish Detail Pen, 6", aluminum handle. No. 630 Spring Bow Divider, center wheel, 3½", metal handle. No. 631 Spring Bow Pencil, center wheel, 3½", metal handle. No. 632 Spring Bow Pen, center wheel, 3½", metal handle. No. 641 Hairspring Divider, 6", with straightening device. No. 643 Compasses, 6", fixed needle point, pen and pencil point, lengthening bar and straightening device.

In pocket book case..... \$18 50

DEFIANCE INSTRUMENTS

High Grade

Rolled German Silver and Finest Quality English Tool Steel



No. 682.

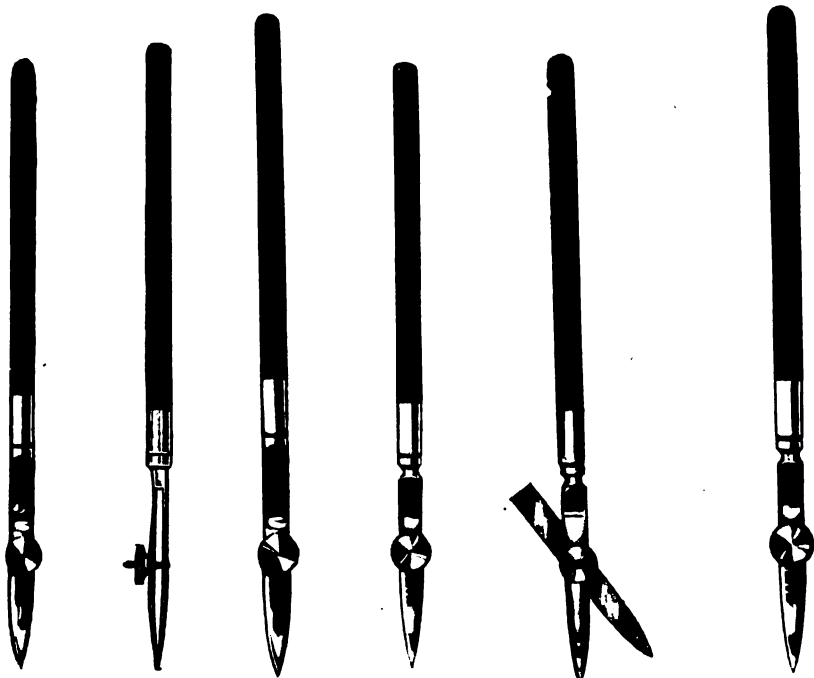
No. 682. Containing:

No. 600 Ruling Pen, $4\frac{1}{2}$ ", ebony handle. No. 602 Ruling Pen, $5\frac{1}{2}$ ", ebony handle. No. 616 Swedish Detail Pen, 6", aluminum handle. No. 626 Steel Spring Bow Dividers, $3\frac{1}{2}$ ", metal handle. No. 627 Steel Spring Bow Pencil, $3\frac{1}{2}$ ", metal handle. No. 628 Steel Spring Bow Pen, $3\frac{1}{2}$ ", metal handle. No. 641 Hair-spring Divider, 6", with straightening device. No. 642 Compasses, $4\frac{1}{2}$ ", with fixed needle point, pen and pencil point and straightening device. No. 643 Compasses, 6", with fixed needle point, pen and pencil point, lengthening bar and straightening device. No. 625 Dotting Pen, with three different dotting wheels. No. 721 Rotary Self-Adjusting Spring Bow Pen and Pencil.

In pocket book case..... \$25 00

DEFIANCE INSTRUMENTS OF PRECISION

Cold Rolled German Silver and Best English Tool Steel



No. 700

No. 701

No. 702

No. 703

No. 704

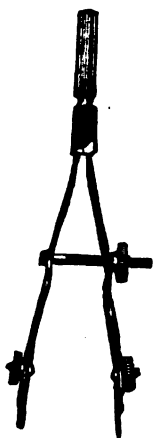
No. 705

No. 700. Ruling Pen, upper blade with spring, $4\frac{1}{4}$ ", ebony handle, Each, \$1 00

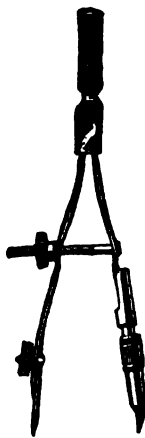
701.	"	"	"	"	"	"	5 "	"	"	"	1 20
702.	"	"	"	"	"	"	$5\frac{1}{2}$ "	"	"	"	1 35
703.	"	"	with cross joint, $4\frac{1}{4}$ ", ebony handle.....							"	1 25
704.	"	"	"	"	"	"	5 "	"	"	.....	1 50
705.	"	"	"	"	"	"	$5\frac{1}{2}$"	"	"	.....	1 65

DEFIANCE INSTRUMENTS OF PRECISION

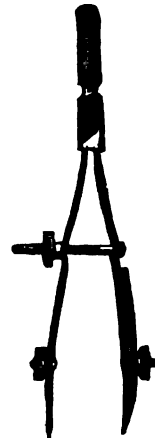
Cold Rolled German Silver and Best English Tool Steel



No. 708

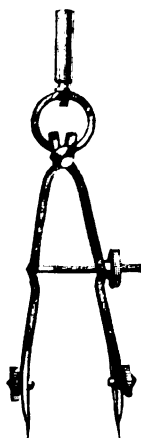


No. 709



No. 710

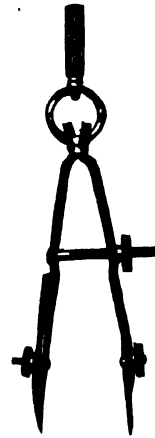
		Each
No. 708.	Steel Spring Bow Dividers, 3½", metal handle.....	\$2 00
709.	" " " Pencil, 3½", " "	2 40
710.	" " " Pen, 3½", " "	2 40
711.	Sets of Bows, Nos. 708, 709, 710, in case.....	Per set, 8 00



No. 708A



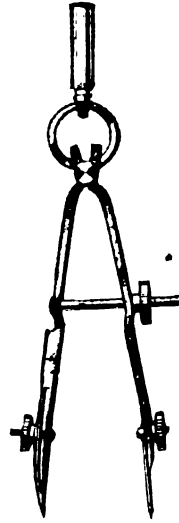
No. 709B



No. 710C

		Each
No. 708A.	Circular Steel Spring Bow Dividers, 3½", metal handle.....	\$2 00
709B.	" " " Pencil, 3½", " "	2 40
710C.	" " " Pen, 3½", " "	2 40
711D.	Set of Bows, Nos. 708A, 709B, 710C, in case.....	Per set, 8 00

Cold Rolled German Silver and Best English Tool Steel



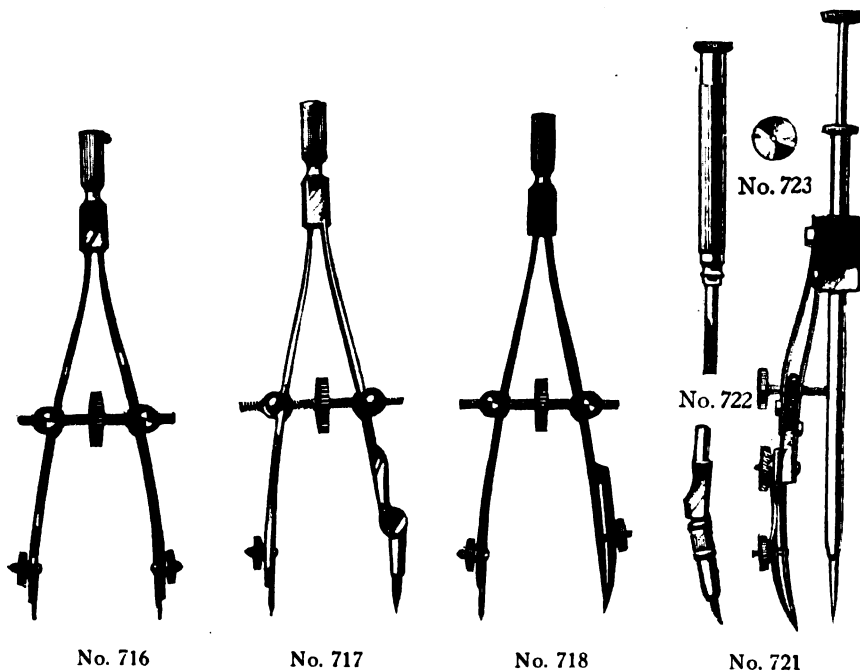
No. 714

No. 714C

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DEFIANCE INSTRUMENTS OF PRECISION

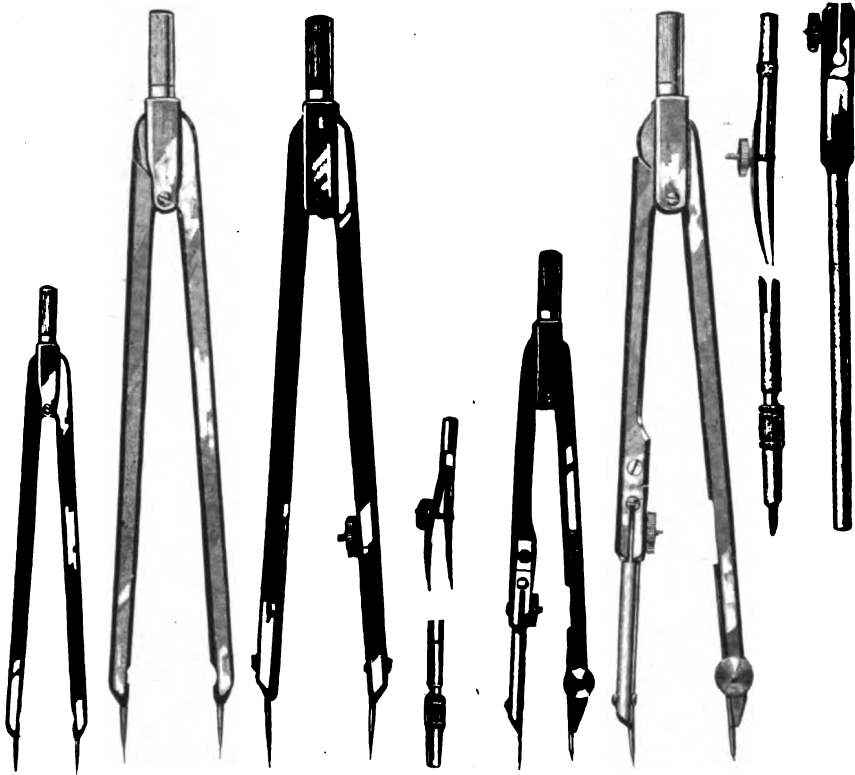
Cold Rolled German Silver and Best English Tool Steel



	Each
No. 716. Steel Spring Center Wheel Bow Dividers, $4\frac{1}{2}$ ", metal handle	\$2 25
717. " " " " " Pencil, $4\frac{1}{4}$ ", " "	2 75
718. " " " " " Pen, $4\frac{1}{4}$ ", " "	2 75
719. Set of Bows, Nos. 716, 717, 718, in case.....	Per set, 8 75
720. Self-Adjusting Spring Bow Pen, $4\frac{1}{2}$ ".....	Each, 3 75
721. " " " " " $4\frac{1}{2}$ ", with Pencil Point..	" 5 00
722. Combination Key and Lead Box.....	" 25
723. Center Tack.....	" 15

DEFIANCE INSTRUMENTS OF PRECISION

Cold Rolled German Silver and Best English Tool Steel



No. 724

No. 725

No. 726

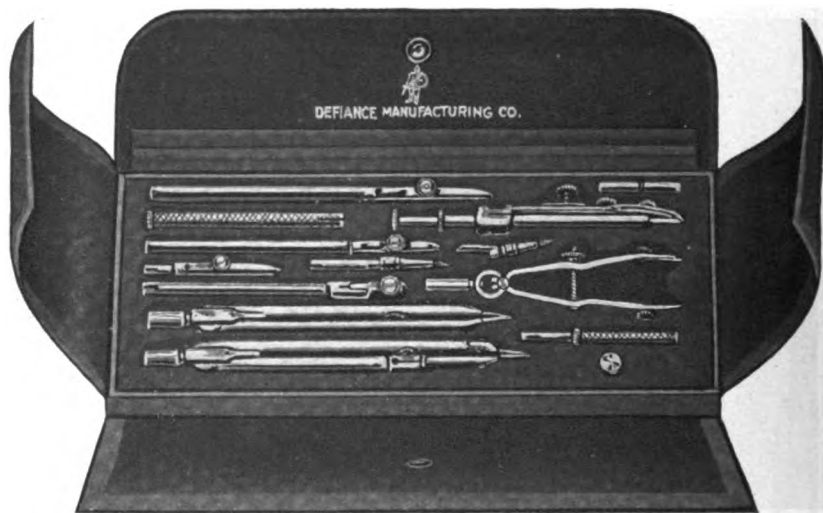
No. 727

No. 728

- | | | |
|----------|---|--------------|
| No. 724. | Plain Dividers, 4", with replaceable steel points..... | Each, \$2 25 |
| 725. | " " 6", " " " " " " | " 3 00 |
| 726. | Hairspring Dividers, 6", with replaceable steel points... | Each, 4 00 |
| 727. | Compasses, 4", with replaceable needle points, pen and pencil points and straightening device..... | Each, 5 00 |
| 728. | Compasses, 6", with replaceable needle points, pen and pencil points, lengthening bar and straightening device..... | Each, 6 00 |

DEFIANCE INSTRUMENTS OF PRECISION

Cold Rolled German Silver and Best English Tool Steel



No. 730.

No. 730. Containing:

No. 700 Ruling Pen, 4½", ebony handle.

702 " " 5½", " "

712 Circular Steel Spring Bow Dividers, 4½", metal handle.

721 Self-Adjusting Spring Bow Pen, pencil point, 4½".

726 Hairspring Dividers, 6", with straightening device.

728 Compasses, 6", with replaceable needle points, pen and pencil points, lengthening bar and straightening device.

Combination Key and Lead Box.

Center Tack.

In pocket book case. Per set..... \$21 50

No. 731. Containing:

No. 700 Ruling Pen, 4½", ebony handle.

702 " " 5½", " "

708 Circular Steel Bow Dividers, 4½", metal handle.

721 Self-Adjusting Spring Bow Pen, with pencil point, 4½".

725 Hairspring Dividers, 6", with straightening device.

727 Compasses, 4", with interchangeable needle points, pen and pencil points and straightening device.

728 Compasses, 6", with interchangeable needle points, pen and pencil points, lengthening bar and straightening device.

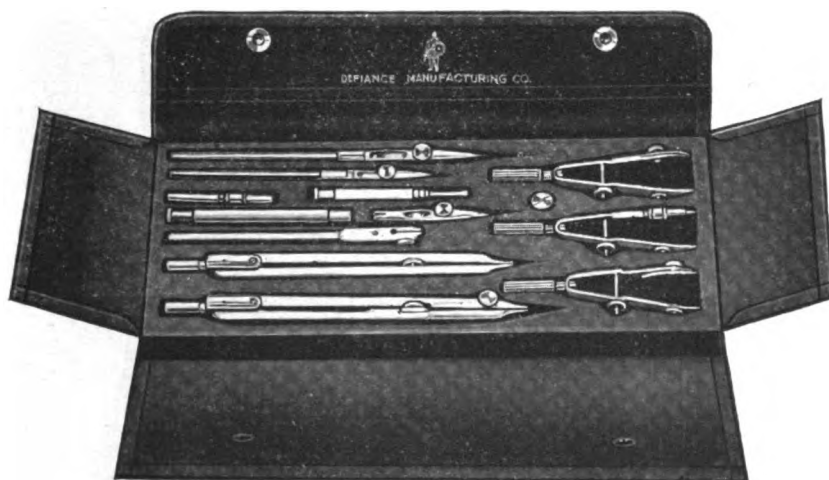
Combination Key and Lead Box.

Center Tack.

In pocket book case. Per set..... \$22 50

DEFIANCE INSTRUMENTS OF PRECISION

Cold Rolled German Silver and Best English Tool Steel



No. 732.

No. 732. Containing:

No. 700 Ruling Pen, 4½", ebony handle.

702 " " 5½", " "

708 Steel Spring Bow Dividers, 3½", metal handle.

709 " " " Pencil, 3½", " "

710 " " " Pen, 3½", " "

725 Hairspring Dividers, 6", with straightening device.

726 Compasses, 6", with replaceable needle points, pen and pencil points, lengthening bar and straightening device.

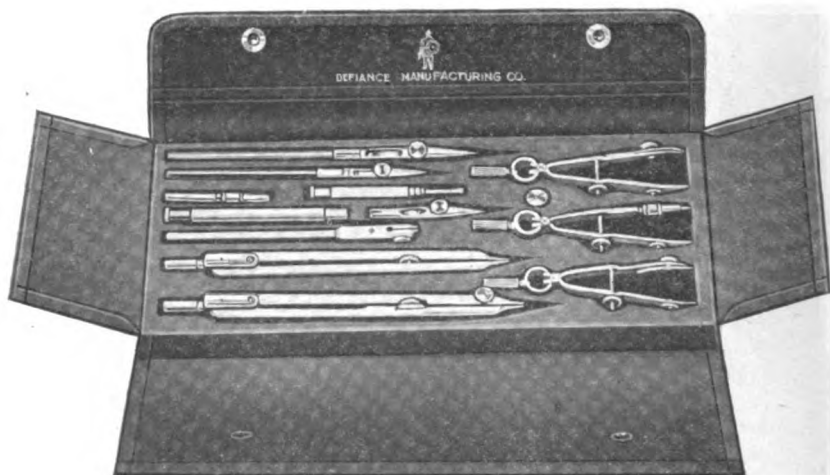
Combination Key and Lead Box.

Center Tack.

In pocket book case. Per set..... \$22 50

DEFIANCE INSTRUMENTS OF PRECISION

Cold Rolled German Silver and Best English Tool Steel



No. 733.

No. 733. Containing:

No. 700 Ruling Pen, $4\frac{1}{2}$ ", ebony handle.

702 " " $5\frac{1}{2}$ ", " "

712 Circular Steel Spring Bow Dividers, $3\frac{1}{2}$ ", metal handle.

713 Circular Steel Spring Bow Pen, $3\frac{1}{2}$ ", metal handle.

714 " " " " Pencil, $3\frac{1}{2}$ ", " "

726 Hairspring Dividers, 6", with straightening device.

728 Compasses, 6", with replaceable needle points, pen and pencil points and lengthening bar.

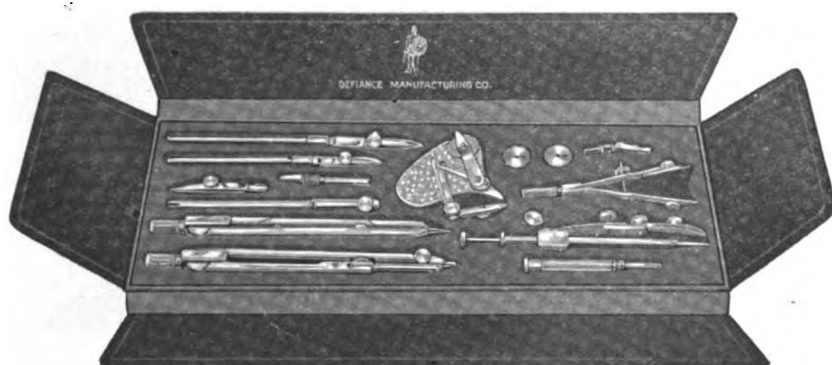
Combination Lead and Key Box.

Center Tack.

In pocket book case. Per set..... \$22 50

DEFIANCE INSTRUMENTS OF PRECISION

Cold Rolled German Silver and Best English Tool Steel



No. 734.

No. 734. Containing:

No. 700 Ruling Pen, $4\frac{1}{4}$ ", ebony handle.

702 " " $5\frac{1}{2}$ ", " "

716 Steel Spring Bow Dividers, $4\frac{1}{4}$ ", metal handle.

625 Dotting Pen, with three different dotting wheels.

721 Self-Adjusting Spring Bow Pen, with pencil point.

726 Hairspring Dividers, 6", with straightening device.

728 Compasses, 6", with replaceable needle points, pen and pencil points, lengthening bar and straightening device.

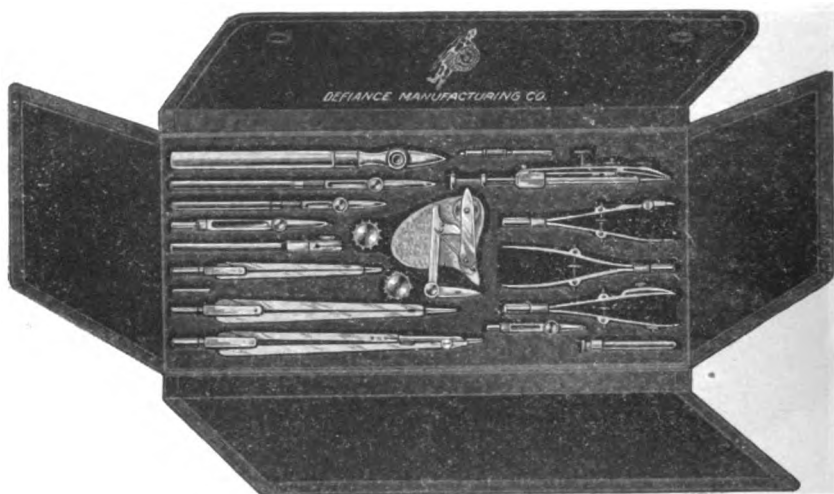
Combination Lead and Key Box.

Center Tack.

In pocket book case. Per set..... \$25 00

DEFIANCE INSTRUMENTS OF PRECISION

Cold Rolled German Silver and Best English Tool Steel.



No. 735.

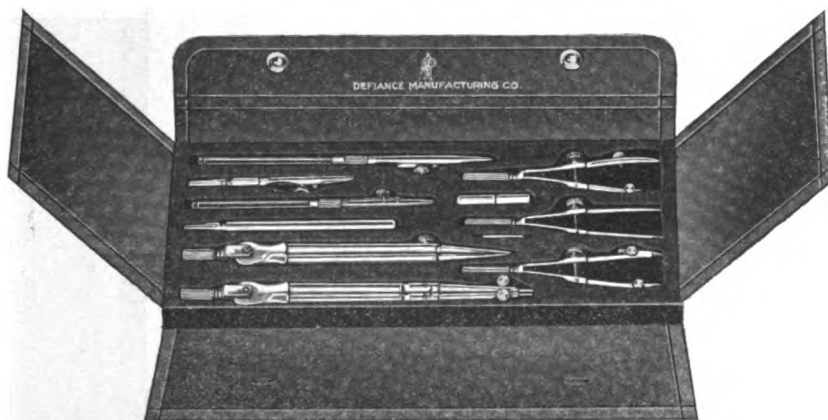
No. 735. Containing:

- No. 616 Swedish Ruling Pen, 6", aluminum handle.
- 700 Ruling Pen, 4½", ebony handle.
- 702 " " 5½", " "
- 716 Steel Spring Center Wheel Bow Dividers, 4½", metal handle.
- 717 " " " " " Pencil, 4½", " "
- 718 " " " " " Pen, 4½", " "
- 625 Dotting Pen, with three different dotting wheels.
- 721 Self-Adjusting Spring Bow Pen, with pencil point, 4½".
- 726 Hairspring Dividers, 6", with straightening device.
- 727 Compasses, 4", with replaceable needle point, pen and pencil points and straightening device.
- 728 Compasses, 6", with replaceable needle points, pen and pencil points, lengthening bar and straightening device; box leads.
- In pocket book case. Per set..... \$40 00

CYLINDRICAL INSTRUMENTS

High Grade

Cold Rolled German Silver and Best English Tool Steel



No. 750.

No. 750. Containing.

Ruling Pen, with cleaning device, 4½", ebony handle.

" " " " 5½", " "

Steel Spring Bow Dividers, 3½", metal handle.

" " " Pencil, 3½", " "

" " " Pen, 3½", " "

Hairspring Dividers, 6", fixed needle point.

Compasses, 6", with adjustable needle points, pen and pencil points and lengthening bar.

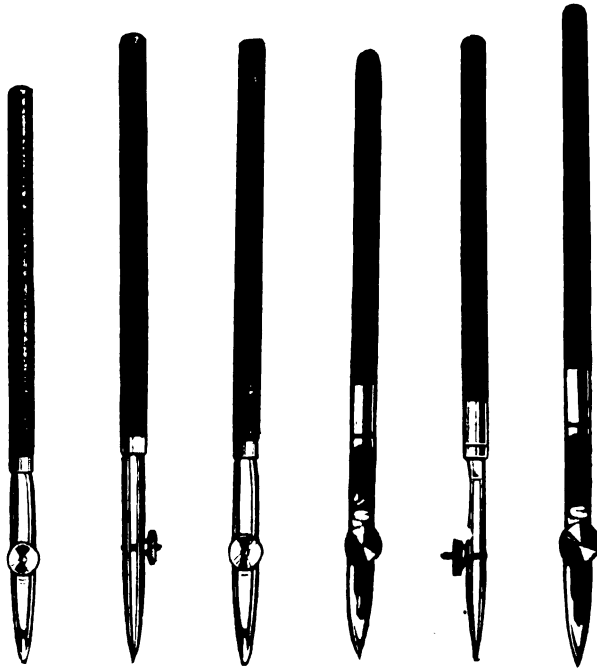
Box of Leads.

In pocket book case. Per set..... \$18 00

STIRLING INSTRUMENTS

Second Grade

Rolled German Silver and Steel



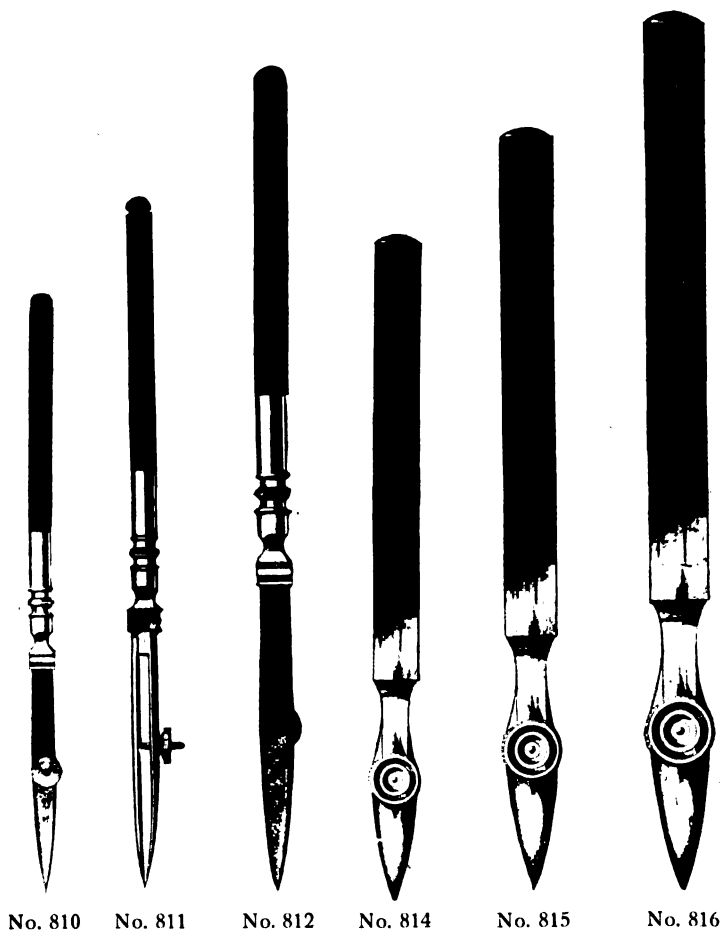
No. 800 No. 801 No. 802 No. 803 No. 804 No. 805

No. 800.	Ruling Pen,	4 $\frac{1}{4}$ "	ebony handle.....	Each, \$0 35
801.	"	"	5", " "	" 45
802.	"	"	5 $\frac{1}{2}$ ", " "	" 50
803.	"	"	4 $\frac{1}{4}$ ", " " upper blade with spring, "	50
804.	"	"	5", " " " " " " " "	60
805.	"	"	5 $\frac{1}{2}$ ", " " " " " " " "	65

STIRLING INSTRUMENTS

Second Grade

Rolled German Silver and Steel

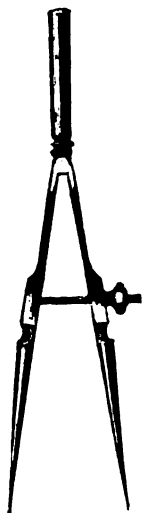


No. 810.	Ruling Pen,	4½",	ebony handle,	with pin and joint.....	Each,	\$0 75
811.	"	"	5 "	"	"	85
812.	"	"	5½",	"	"	95
814.	Swedish Detail Pen,	5",	ebony handle.....	"	1 20	
815.	"	"	6",	"	"	1 50
816.	"	"	7",	"	"	1 75

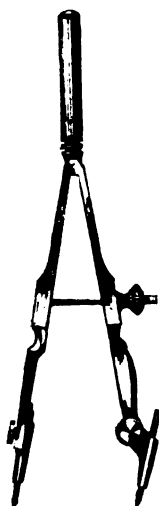
STIRLING INSTRUMENTS

Second Grade

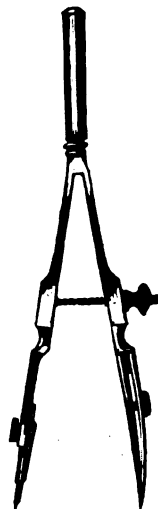
Rolled German Silver and Steel



No. 820.



821.

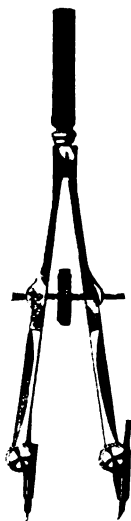


822.

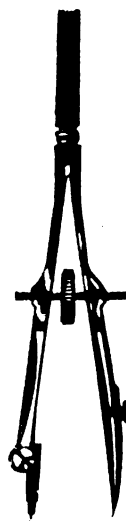
No. 820.	Steel Spring Bow Dividers, $3\frac{1}{2}$ ", metal handle.....	Each, \$1 00
821.	" " " Pencil, $3\frac{1}{4}$ ", " "	" 1 25
822.	" " " Pen, $3\frac{1}{4}$ ", " "	" 1 25
823.	Sets of Bows, Nos. 820, 821, 822, in case.....	Per set, 4 25



No. 824.



825.



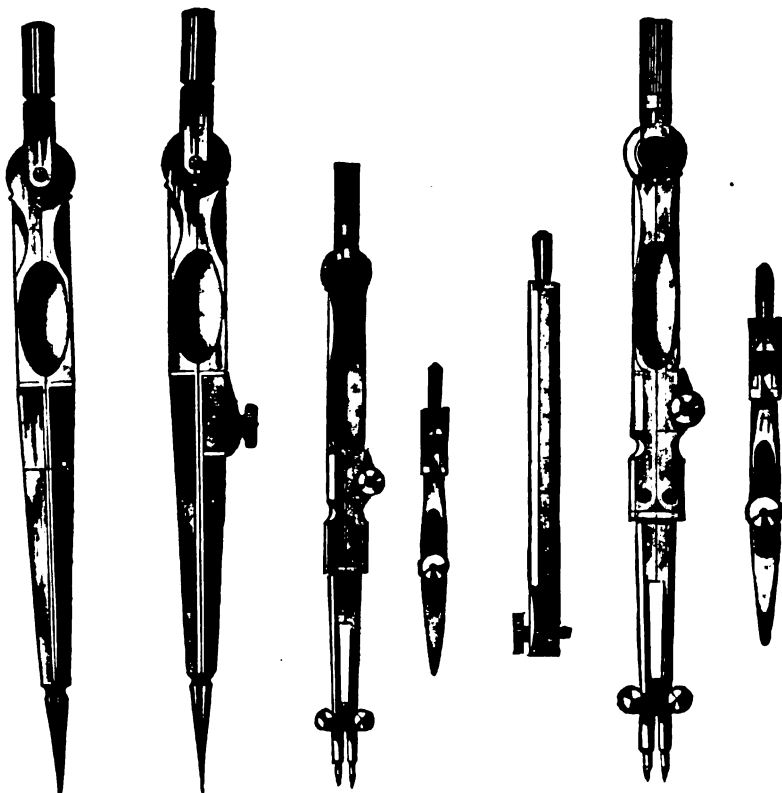
826.

No. 824.	Steel Spring Bow Dividers, $3\frac{1}{2}$ ", metal handle. center wheel.....	Each, \$1 25
825.	" " " Pencil, $3\frac{1}{4}$ ", " "	" 1 50
826.	" " " Pen, $3\frac{1}{4}$ ", " "	" 1 50
827.	Set of Bows, Nos. 824, 825, 826, in case.....	Per set, 4 75

STIRLING INSTRUMENTS

Second Grade

Rolled German Silver and Steel



No. 828

No. 829

No. 830

No. 831

- | | | |
|----------|---|--------------|
| No. 828. | Plain Dividers, 6", with fixed needle point..... | Each, \$0 80 |
| 829. | Hairspring Dividers, 6", with fixed needle point..... | " 1 75 |
| 829B. | " " 6", " " " " straighten-
ing device..... | Each, 2 00 |
| 830. | Compasses, 4½", with fixed needle point, pen and pencil
points..... | Each, 2 25 |
| 831. | Compasses, 6", with fixed needle point, pen and pencil
points and lengthening bar..... | Each, 2 50 |
| 832. | Compasses, like No. 831, but with straightening device.. | " 2 75 |

PROPORTIONAL DIVIDERS



No. 840



No. 841



No. 843



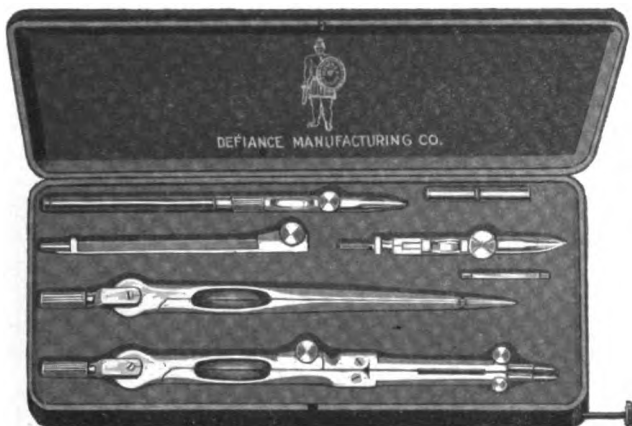
No. 844

- No. 840. Proportional Dividers, 7 $\frac{1}{4}$ ", for lines and circles, in case..Each, \$7 00
841. " " 7 $\frac{1}{4}$ ", with rack movement, for lines,
circles, planes and solids, in case.....Each, 10 00
842. Proportional Dividers, 9", for lines and circles, in case... " 10 00
843. " " with rack movement, 6 $\frac{1}{2}$ ", for lines and
circles.....Each, 5 75
844. Proportional Dividers, 6 $\frac{1}{4}$ ", for lines and circles..... " 2 50

STIRLING INSTRUMENTS

Second Grade

Rolled German Silver and Steel

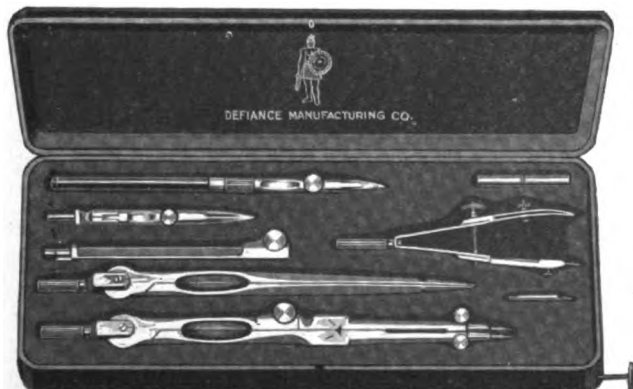


No. 850. Containing:

No. 850

- No. 812 Ruling Pen, $5\frac{1}{2}$ ", ebony handle.
- 828 Plain Dividers, 6", fixed needle point.
- 831 Compasses, 6", fixed needle point, pen and pencil point and lengthening bar.
- Box of Leads.

In bar lock case. Per set..... \$4 50



No. 852. Containing:

No. 852

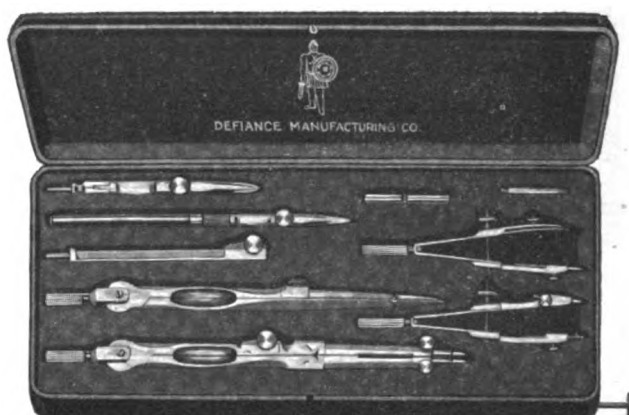
- No. 812 Ruling Pen, $5\frac{1}{2}$ ", ebony handle.
- 822 Steel Spring Bow Pen, $3\frac{1}{4}$ ", metal handle.
- 828 Plain Dividers, 6", fixed needle point.
- 831 Compasses, 6", fixed needle point, pen and pencil points and lengthening bar.
- Box of Leads.

In bar lock case. Per set..... \$5 75

STIRLING INSTRUMENTS

Second Grade

Rolled German Silver and Steel.



No. 854

No. 854. Containing:

No. 805 Ruling Pen, $5\frac{1}{2}$ ", ebony handle.

821 Steel Spring Bow Pencil, $3\frac{1}{2}$ ", metal handle.

822 " " " Pen, $3\frac{1}{2}$ ", " "

829 Hairspring Dividers, 6", fixed needle point.

831 Compasses, 6", fixed needle point, pen and pencil points and lengthening bar.

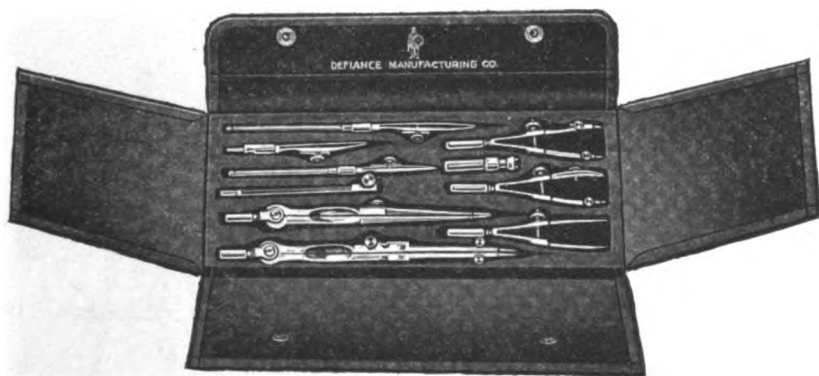
Box of Leads.

In bar lock case. Per set..... \$7 25

STIRLING INSTRUMENTS

Second Grade

Rolled German Silver and Steel



No. 865

No. 865. Containing:

No. 803 Ruling Pen, 4½", ebony handle.

805 " " 5½", " "

820 Steel Spring Bow Dividers, 3½", metal handle.

821 " " " Pencil, 3½", " "

822 " " " Pen, 3½", " "

829 Hairspring Dividers, 6", fixed needle point.

831 Compasses, 6", fixed needle point, pen and pencil points and lengthening bar.

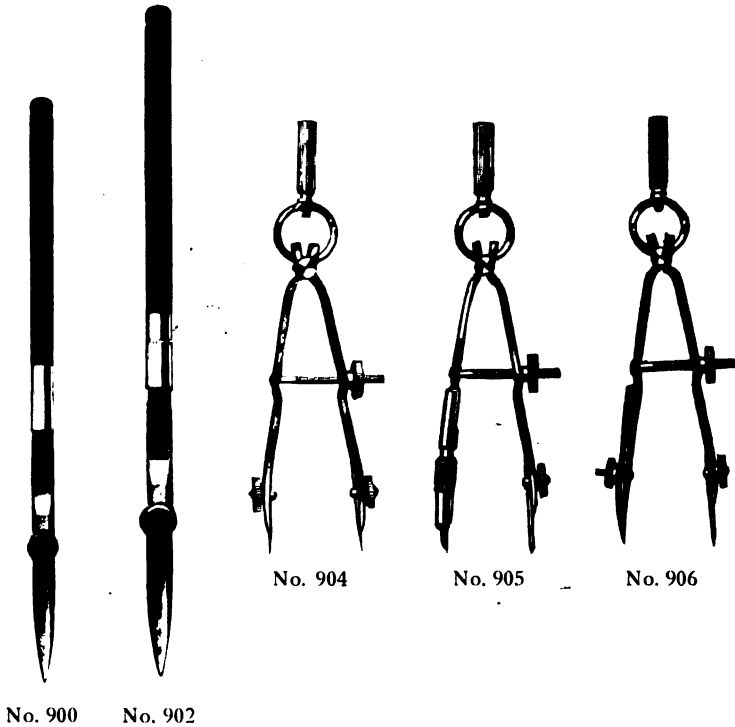
Box of Leads.

In pocket book case. Per set..... \$10 00

No. 867. Containing same assortment as No. 865, but Dividers and Compasses have straightening device. Per set..... 10 40.

"RELIABLE" INSTRUMENTS

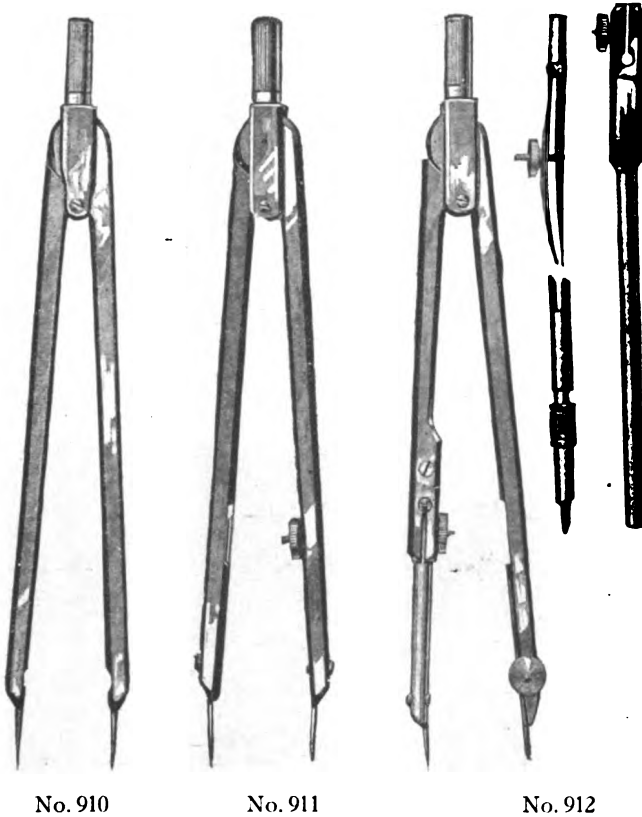
German Silver and Steel



No. 900.	Ruling Pen, 4 ",	ebony handle.....	Each, \$0 45
902.	" "	5½", " "	" 55
904.	Circular Steel Spring Bow Dividers, 3½",	metal handle..	" 75
905.	" " " "	Pencil, 3½", " " ..	" 1 00
906.	" " " "	Pen, 3½", " " ..	" 1 00
907.	" " " "	Combination Bow Pen and Pencil	" 1 25

“RELIABLE” INSTRUMENTS—Continued

German Silver and Steel



No. 910.	Plain Dividers, 6".....	Each, \$0 75
911.	Hairspring Dividers, 6".....	" 1 50
912.	Compasses, 6", with fixed needle point, pen and pencil points and lengthening bar.....	" 2 25

“RELIABLE” INSTRUMENTS—Continued

German Silver and Steel



No. 925

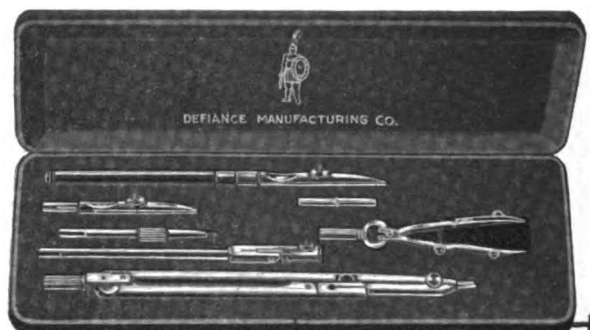
No. 925. Containing:

No. 902 Ruling Pen, 5½", ebony handle.

912 Compasses, 6", with fixed needle point, pen, pencil and lengthening bar.

Box of Leads.

In bar lock case. Per set..... \$3 75



No. 926

No. 926. Containing:

No. 902 Ruling Pen, 5½", ebony handle.

906 Circular-Steel Spring Bow Pen, 3½", metal handle.

912 Compasses, 6", with fixed needle point, pen, pencil points and lengthening bar.

Box of Leads.

In bar lock. Per set..... \$5 00

No. 927. Containing same assortment as No. 926, but with Plain Dividers, No. 910, in addition. Per set..... \$5 75

No. 928. Containing same assortment as No. 926, but with Circular Bow Pencil, No. 905, and Plain Dividers, No. 926, in addition. Per set..... \$6 75

“RELIABLE” INSTRUMENTS—Continued

German Silver and Steel



No. 930. Containing:

No. 930

No. 902 Ruling Pen, 5½", ebony handle; No. 904 Circular Steel Spring Dividers, 3½", metal handle; No. 905 Circular Steel Spring Pencil, 3½", metal handle; No. 906 Circular Steel Spring Pen, 3½", metal handle; No. 910 Plain Dividers, 6"; No. 912 Compasses, 6", with fixed needle point, pen, pencil points and lengthening bar; box of leads. In bar lock case. Per set..... \$7 75



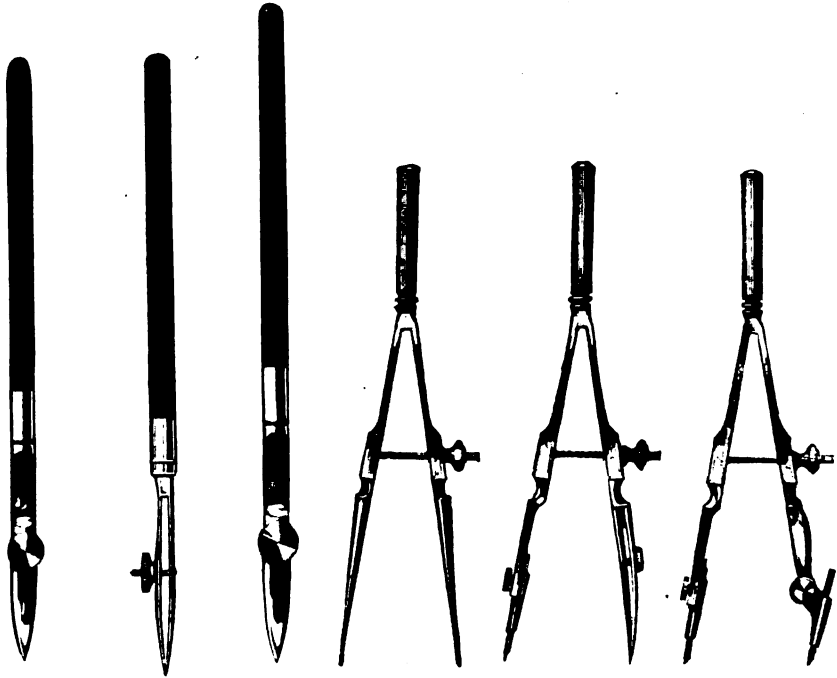
No. 932. Containing:

No. 932

No. 900 Ruling Pen, 4", ebony handle; No. 902 Ruling Pen, 5½", ebony handle; No. 904 Circular Steel Spring Dividers, 3½", metal handle; No. 905 Circular Steel Spring Pencil, 3½", metal handle; No. 906 Circular Steel Spring Pen, 3½", metal handle; No. 911 Hairspring Dividers, 6"; No. 912 Compasses, 6", fixed needle point, pen, pencil points and lengthening bar; box of leads. In bar lock case. Per set..... \$9 00

"ACME" INSTRUMENTS

German Silver and Steel Points



No. 950 No. 951 No. 952 No. 954 No. 955 No. 956

No. 950.	Ruling Pen, 4 ",	spring blade.....	Each, \$0 40
951.	" " 5 ",	" " 	" 50
952.	" " 5½",	" " 	" 55
954.	Steel Spring Bow Dividers, 3½",	metal handle.....	" 75
955.	" " " Pencil, 3½",	" " 	" 1 00
956.	" " " Pen, 3½",	" " 	" 1 00

"ACME" INSTRUMENTS (Continued)

German Silver and Steel Points



No. 960



No. 962



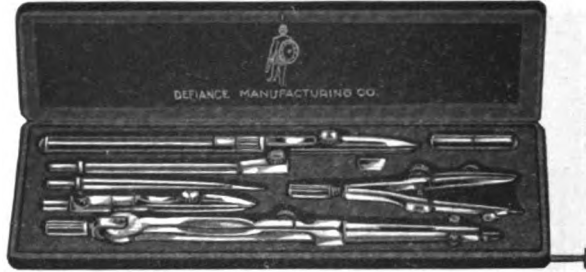
No. 964



No. 960.	Plain Dividers, 6".....	Each, \$0 60
962.	Hairspring Dividers, 6".....	" 1 25
964.	Compasses, 6", fixed needle point, pen, pencil points and lengthening bar.....	" 1 80

"ACME" INSTRUMENTS (Continued)

German Silver and Steel Points



No. 970

No. 970. Containing:

No. 952 Ruling Pen, 5½", spring blade.

956 Steel Spring Bow Pen, 3½", metal handle.

964 Compasses, 6", fixed needle point, pen, pencil points
and lengthening bar.

Box of Leads.

In bar lock case. Per set..... \$3 85



No. 972

No. 972. Containing:

No. 952 Ruling Pen, 5½", spring blade.

956 Steel Spring Bow Pen, 3½", metal handle.

906 Plain Dividers, 6".

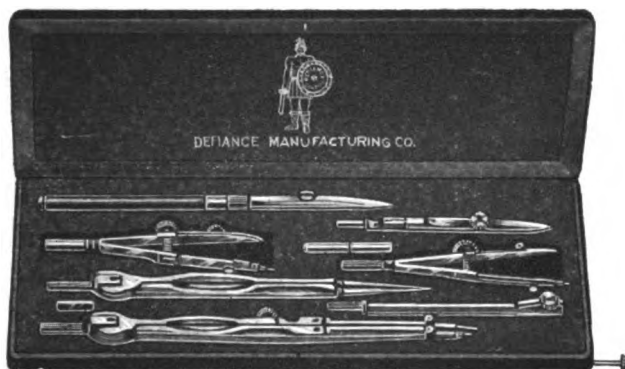
964 Compasses, 6", fixed needle point, pen, pencil points
and lengthening bar.

Box of Leads.

In bar lock case. Per set..... \$4 50

"ACME" INSTRUMENTS (Continued)

German Silver and Steel Points



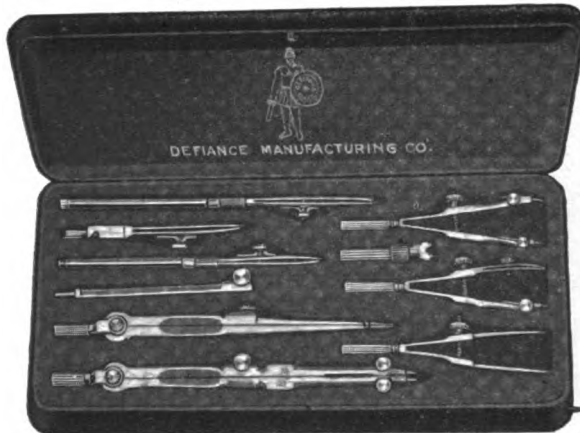
- No. 974. Containing: No. 974
- No. 952 Ruling Pen, $5\frac{1}{2}$ ", spring blade.
 - 955 Steel Spring Bow Pencil, $3\frac{1}{2}$ ", metal handle.
 - 956 " " " Pen, $3\frac{1}{2}$ ", " "
 - 960 Plain Dividers, 6".
 - 964 Compasses, 6", fixed needle point, pen, pencil points and lengthening bar.
 - Box of Leads.
 - In bar lock case. Per set..... \$5.75



- No. 976. Containing: No. 976
- No. 952 Ruling Pen, $5\frac{1}{2}$ ", spring blade.
 - 954 Steel Spring Bow Dividers, $3\frac{1}{2}$ ", metal handle.
 - 955 " " " Pencil, $3\frac{1}{2}$ ", " "
 - 956 " " " Pen, $3\frac{1}{2}$ ", " "
 - 960 Plain Dividers, 6".
 - 964 Compasses, 6", fixed needle point, pen, pencil points and lengthening bar.
 - Box of Leads.
 - In bar lock case. Per set..... \$6.75

"ACME" INSTRUMENTS (Continued)

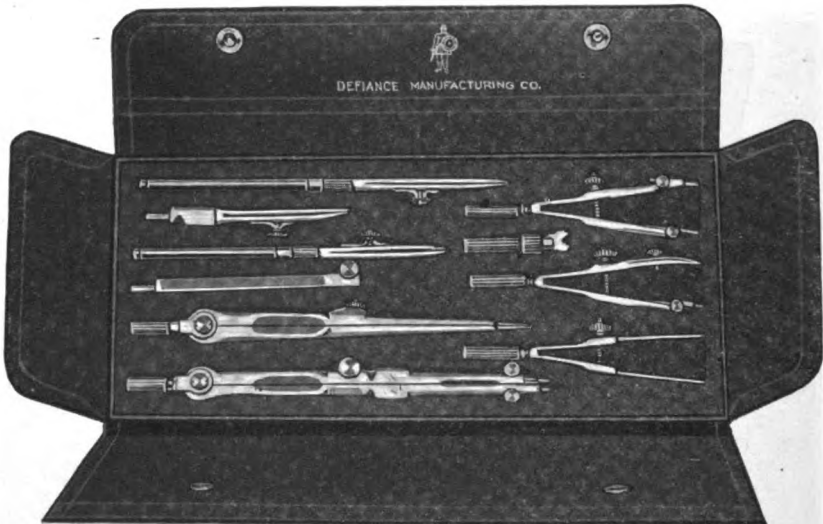
German Silver and Steel Points



No. 978. Containing:

No. 978

No. 950 Ruling Pen, 4", spring blade; No. 952 Ruling Pen, 5½", spring blade; No. 954 Steel Spring Bow Dividers, 3½", metal handle; No. 955 Steel Spring Bow Pencil, 3½", metal handle; No. 956 Steel Spring Bow Pen, 3½", metal handle; No. 962 Hairspring Dividers, 6"; No. 964 Compasses, 6", fixed point, pen, pencil points and lengthening bar; box of leads. In bar lock case. Per set..... \$7 25



No. 980. Containing:

No. 980

No. 950 Ruling Pen, 4", spring blade; No. 952 Ruling Pen, 5½", spring blade; No. 954 Steel Spring Bow Dividers, 3½", metal handle; No. 955 Steel Spring Bow Pencil, 3½", metal handle; No. 956 Steel Spring Bow Pen, 3½", metal handle; No. 962 Hairspring Dividers, 6"; No. 964 Compasses, 6", fixed needle point, pen, pencil points and lengthening bar; box of leads. In pocket book case. Per set..... \$7 75

GERMAN SILVER SCHOOL INSTRUMENTS

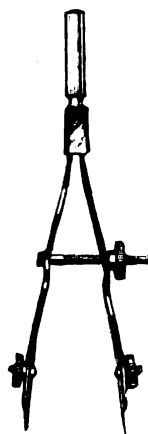
German Silver School Instruments



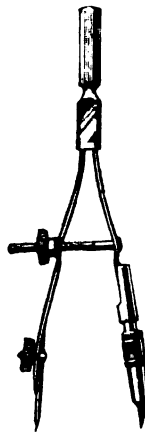
No. 1000



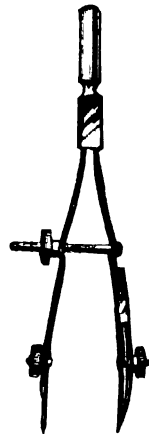
No. 1001



No. 1002



No. 1003

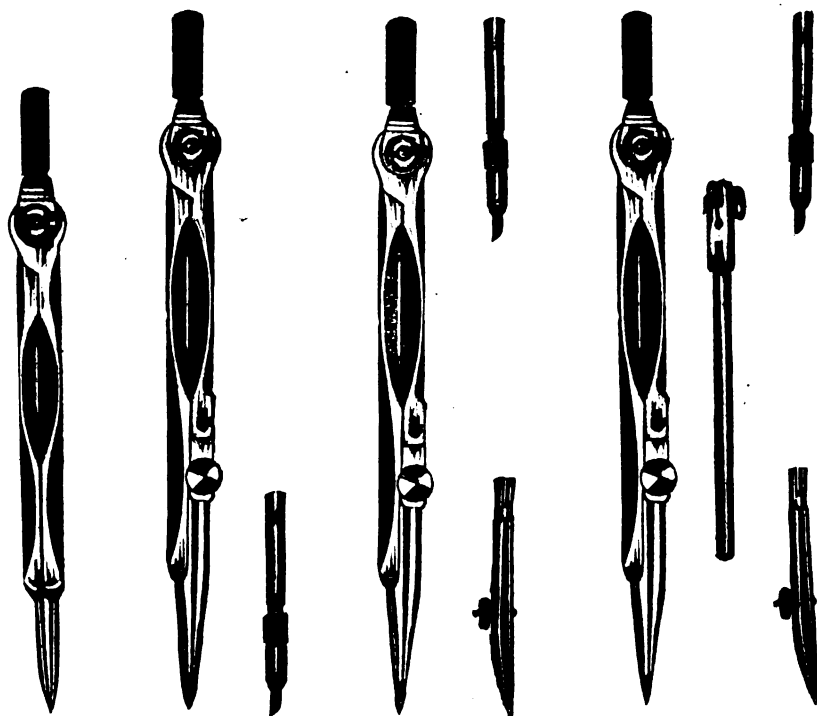


No. 1004

No. 1000.	Ruling Pen, 5 "	metal handle.....	Each, \$0 15
1001.	" "	5½", ebony "	" 30
1002.	Spring Bow Dividers, 3½"	metal handle.....	" 65
1003.	" "	Pencil, 3½", " "	" 85
1004.	" "	Pen, 3½", " "	" 85

GERMAN SILVER SCHOOL INSTRUMENTS (Continued)

German Silver School Instruments



No. 1005

No. 1006

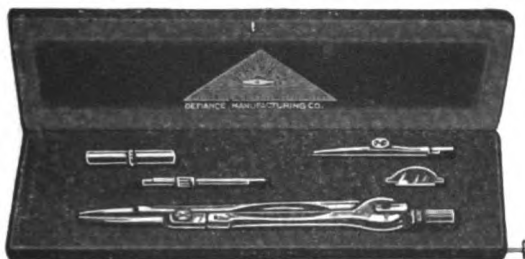
No. 1007

No. 1008

No. 1005.	Plain Dividers, 5"	.....	Each, \$0 40
1006.	Compasses, 5½"	with pencil point.....	" 65
1007.	" 5½"	" pen and pencil point.....	" 85
1008.	" 5½"	" " " " " and length- ening bar.....	" 95

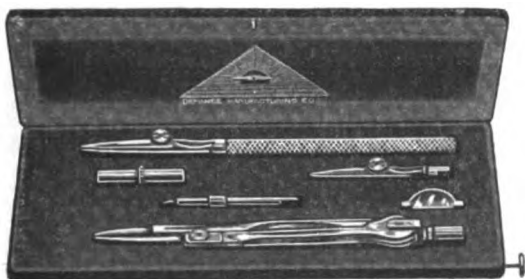
GERMAN SILVER SCHOOL INSTRUMENTS (Continued)

German Silver School Instruments



No. 1010

- No. 1010. Containing Compasses, 5 $\frac{1}{4}$ ", with pen and pencil points, ruler and protractor.
Key and Lead Box. Per set..... \$0 90



No. 1012

- No. 1012. Containing Ruling Pen, 5", Compasses, 5 $\frac{1}{4}$ ", with pen and pencil points, ruler and protractor.
Key and Lead Box. Per set..... \$1 10

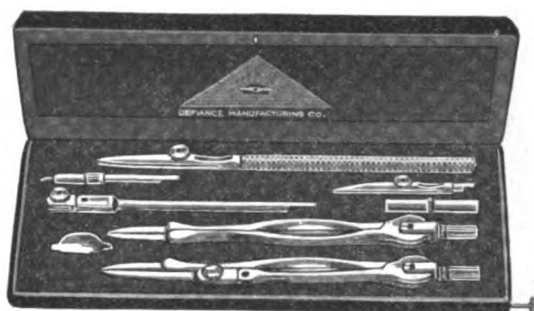


No. 1014

- No. 1014. Containing Ruling Pen, 5", Compasses, 5 $\frac{1}{4}$ ", with pen and pencil points and lengthening bar, ruler, protractor and triangle.
Key and Lead Box. Per set..... \$1 35

GERMAN SILVER SCHOOL INSTRUMENTS (Continued)

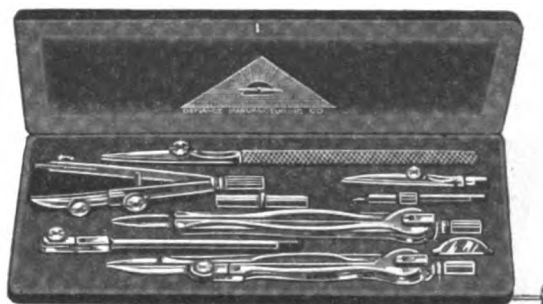
German Silver School Instruments



No. 1016

No. 1016. Containing Ruling Pen, $5\frac{1}{2}$ "; Plain Dividers, 5"; Compasses, $5\frac{1}{4}$ ", with pen, pencil points and lengthening bar, ruler, protractor and triangle.

Key and Lead Box. Per set..... \$1 60



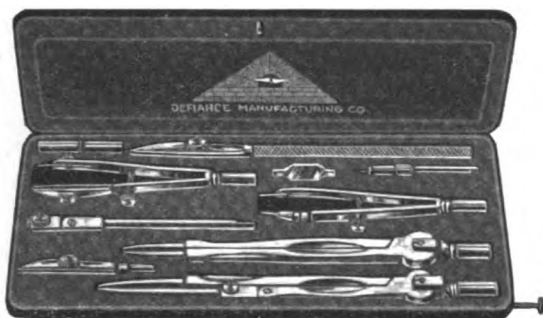
No. 1018

No. 1018. Containing Ruling Pen, 5"; Spring Bow Pen, $3\frac{1}{2}$ "; Plain Dividers, 5"; Compasses, $5\frac{1}{4}$ ", with pen, pencil points and lengthening bar, ruler, protractor and triangle.

Key and Lead Box. Per set..... \$2 25

GERMAN SILVER SCHOOL INSTRUMENTS (Continued)

German Silver School Instruments



No. 1020

- No. 1020. Containing Ruling Pen, 5"; Spring Bow Pencil, 3½"; Spring Bow Pen, 3½"; Plain Dividers, 5"; Compasses with pen, pencil points and lengthening bar, ruler, protractor and triangle.

Key and Lead Box. Per set..... \$3 40

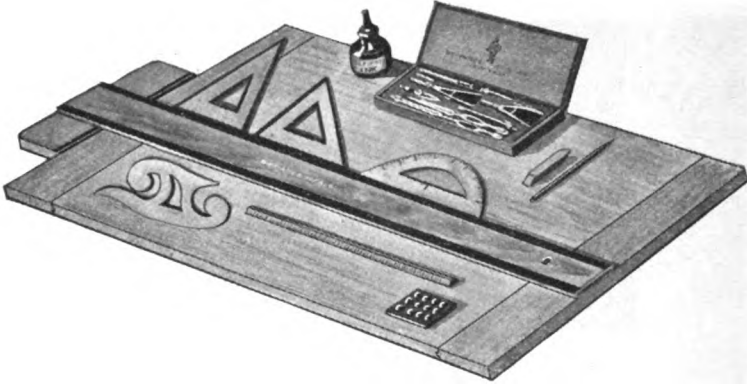


No. 1022

- No. 1022. Containing Ruling Pen, 5"; Spring Bow Dividers, 3½"; Spring Bow Pencil, 3½"; Spring Bow Pen, 3½"; Plain Dividers, 5"; Compasses, 5¼", pen, pencil points and lengthening bar, ruler, protractor and triangle.

Key and Lead Box. Per set..... \$4 00

STUDENT'S DRAWING OUTFIT



No. 1200

The above illustration represents an outfit which is specially adapted for students taking an Engineering or Mechanical Drawing Course and consists of the following instruments and material:

- 1 Set of Drawing Instruments.
- 1 Drawing Board.
- 1 T-Square.
- 1 Protractor.
- 1 Triangle, $30^{\circ} \times 60^{\circ}$.
- 1 Triangle, 45° .
- 1 Irregular Curve.
- 1 Dozen Thumb Tacks.
- 1 Drawing Pencil.
- 1 Bottle Drawing Ink.
- 1 Ink and Pencil Eraser.
- 2 Sheets Tracing Cloth.
- 6 Sheets Drawing Paper.

As there is such a variety of the various articles as listed in this catalogue to choose from and each district has its own requirements, we shall be pleased to quote special outfits similar to above upon application. State catalogue number of the various articles desired.

WOODEN BLACKBOARD DIVIDERS



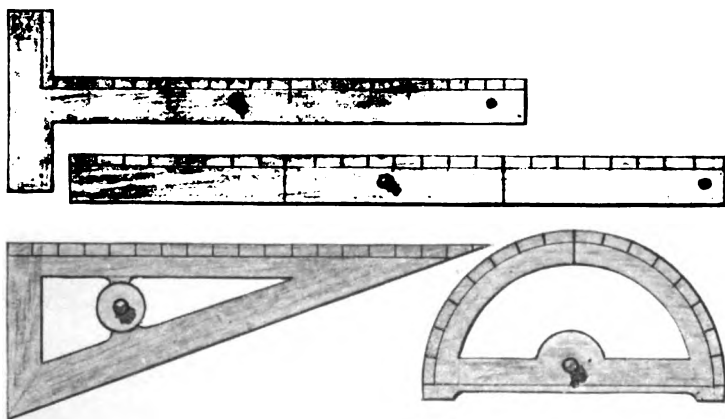
No. 1250



No. 1253

No. 1250.	Wooden Blackboard Dividers, 15".....	Each, \$1 25
1251.	" " " 18".....	" 1 75
1252.	" " " 15", with arc.....	" 1 75
1253.	" " " 18", " "	" 2 00

WOODEN BLACKBOARD DRAWING SET

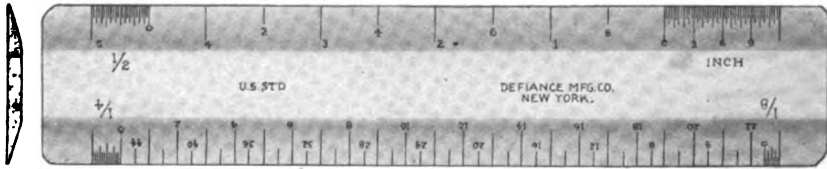


No. 1260

No. 1260.	Wooden Blackboard Drawing Set, consisting of 15½" Protractor, 24" Triangle, 25" T-Square, 36" Straight Edge, all divided to inches.....	Per set, \$5 00
1260A.	Protractor of above set.....	Each, \$1 25
1260B.	Triangle " " "	" 1 25
1260C.	T-Square " " "	" 1 25
1260D.	Straight Edge " "	" 1 25

FLAT BOXWOOD SCALES

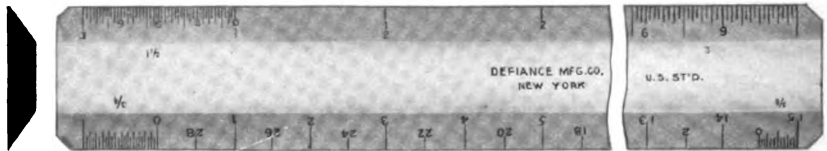
U. S. Standard. Machine Divided



No. 1579

Divided: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$ and 1" to the foot

No. 1579.	Flat Boxwood Scale,	6" long.....	Each, \$0 45
1580.	" "	" 12" "	" 70
1581.	" "	" 18" "	" 1 35
1582.	" "	" 24" "	" 1 75



No. 1584

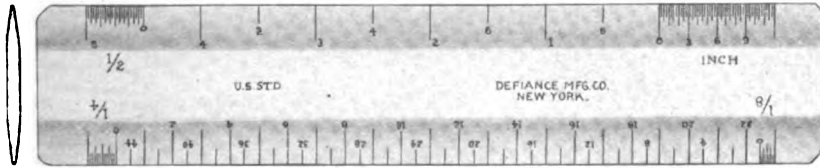
Divided $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$ and 3 inches to the foot.

No. 1583.	Flat Boxwood Scale,	6" long.....	Each, \$0 45
1584.	" "	" 12" "	" 70
1585.	" "	" 18" "	" 1 35
1586.	" "	" 24" "	" 1 75

If special scales are ordered, send sketch showing graduations and numbering, also remittance covering the entire cost, figured at double list price of regular scales of same type.

BOXWOOD SCALES—Continued

U. S. Standard. Machine Divided

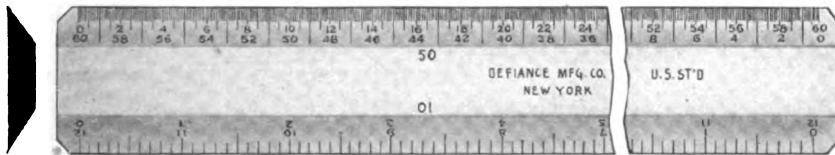


No. 1593

Divided $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1, $\frac{3}{4}$, 1, $1\frac{1}{2}$ and 3" to the foot

- | | | |
|-----------|---|--------------|
| No. 1593. | Flat Boxwood Scales, Beveled on both sides. 6" long, both sides beveled and divided..... | Each, \$0 80 |
| 1594. | Flat Boxwood Scales, Beveled on both sides. 12" long, both sides beveled and divided..... | Each, 1 10 |
| 1595. | Flat Boxwood Scales, Beveled on both sides. 18" long, both sides beveled and divided..... | Each, 2 15 |
| 1596. | Flat Boxwood Scales, Beveled on both sides. 24" long, both sides beveled and divided..... | Each, 2 90 |

CHAIN SCALES



No. 1605

- | | | |
|-----------|--|--------------|
| No. 1599. | Flat Boxwood Chain Scale, 6" divided 10 × 50 parts to the inch | Each, \$0 45 |
| 1600. | Flat Boxwood Chain Scale, 6" divided 20 × 40 parts to the inch | Each, 45 |
| 1601. | Flat Boxwood Chain Scale, 6" divided 30 × 60 parts to the inch | Each, 45 |
| 1602. | Flat Boxwood Chain Scale, 6" divided 80 × 100 parts to the inch | Each, 70 |
| 1605. | Flat Boxwood Chain Scale, 12" divided 10 × 50 parts to the inch | Each, 70 |
| 1606. | Flat Boxwood Chain Scale, 12" divided 20 × 40 parts to the inch | Each, 70 |
| 1607. | Flat Boxwood Chain Scale, 12" divided 30 × 60 parts to the inch | Each, 70 |
| 1608. | Flat Boxwood Chain Scale, 12" divided 80 × 100 parts to the inch | Each, 1 10 |

BOXWOOD SCALES—Continued

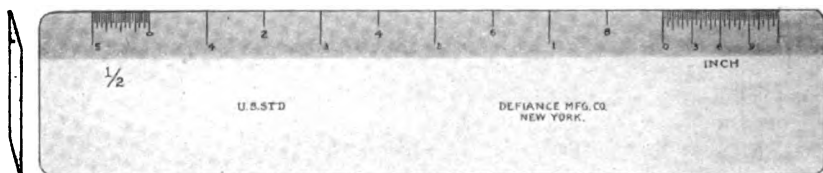
METRIC SCALES

U. S. Standard. Machine Divided

No. 1614.	Flat Boxwood Metric Scale, 10 cm. long, divided mm. and half mm.	Each,	\$0 50
1615.	Flat Boxwood Metric Scale, 20 cm. long, divided mm. and half mm.	Each,	60
1616.	Flat Boxwood Metric Scale, 30 cm. long, divided mm. and half mm.	Each,	75
1617.	Flat Boxwood Metric Scale, 50 cm. long, divided mm. and half mm.	Each,	1 40

OPPOSITE BEVEL BOXWOOD SCALES

U. S. Standard. Machine Divided



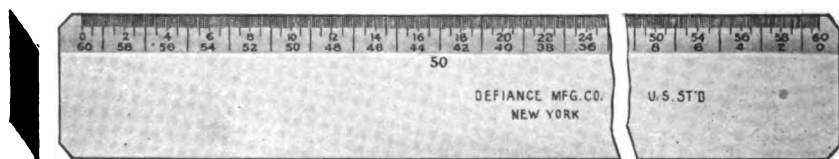
No. 1621

These scales are an improvement over the regular flat scale as only one graduated edge is exposed when in use.

Divided: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1" to the foot

No. 1621.	6" long, opposite bevel boxwood.....	Each,	\$0 45
1622.	12" long, opposite bevel boxwood.....	"	70

OPPOSITE BEVEL CHAIN SCALES



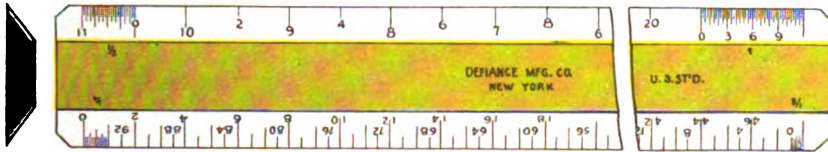
No. 1625

No. 1625.	Opposite bevel boxwood chain scale, 6" divided 10 \times 50 parts to inch.....	Each,	\$0 45
1627.	Opposite bevel boxwood chain scale, 6" divided 20 \times 40 parts to inch.....	Each,	45
1628.	Opposite bevel boxwood chain scale, 6" divided 30 \times 60 parts to inch.....	Each,	45
1630.	Opposite bevel boxwood chain scale, 6" divided 80 \times 100 parts to inch.....	Each,	70
1632.	Opposite bevel boxwood chain scale, 12" divided 10 \times 50 parts to inch.....	Each,	70
1634.	Opposite bevel boxwood chain scale, 12" divided 20 \times 40 parts to inch.....	Each,	70
1636.	Opposite bevel boxwood chain scale, 12" divided 30 \times 60 parts to inch.....	Each,	70
1638.	Opposite bevel boxwood chain scale, 12" divided 80 \times 100 parts to inch.....	Each,	1 10

FLAT WHITE EDGE SCALES

U. S. Standard. Machine Divided

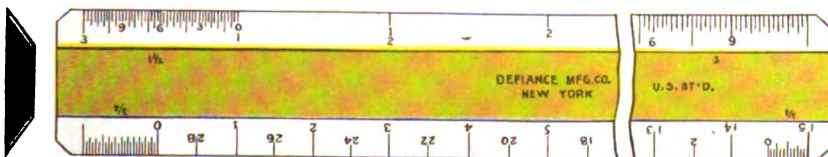
Our white edge scales are made of the finest boxwood with the graduation on inlaid celluloid facing. This renders the divisions very clear and distinct.



No. 1644

Divided $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$ and 1" to the foot

No. 1643.	6" long flat white edge scale.....	Each, \$0 70
1644.	12" " " " " "	" 1 15
1645.	18" " " " " "	" 2 10
1646.	24" " " " " "	" 2 75



No. 1651

Divided: $\frac{1}{8}$, $\frac{1}{4}$, $1\frac{1}{2}$, and 3 inches to the foot.

No. 1650.	6" long, flat white edge scale.....	Each, \$0 70
1651.	12" " " " " "	" 1 15
1652.	18" " " " " "	" 2 10
1653.	24" " " " " "	" 2 75

FLAT WHITE EDGE SCALES—Continued

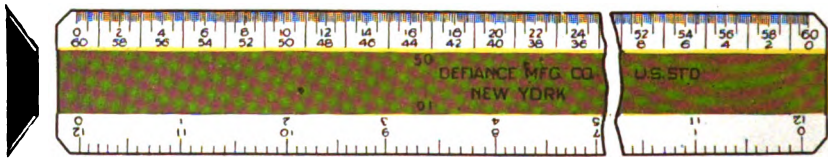
U. S. Standard. Machine Divided



No. 1659

Divided: $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, 1, $\frac{3}{4}$, $\frac{1}{2}$, $1\frac{1}{2}$ and 3" to the foot

No. 1659.	Flat white edge scale, 6", both sides beveled and graduated, in leather sheath, less than 1" wide, very convenient for the pocket	Each, \$1 35
No. 1660.	Flat white edge scale, 12", both sides beveled and divided, "	2 00
1661.	" " " " 18", " " " " " " "	3 40
1662.	" " " " 24", " " " " " " "	4 60



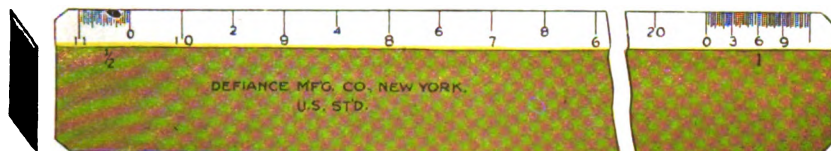
No. 1671

										Each,
No. 1667.	White edge chain scale, 6", divided 10 × 50 parts to the inch..									\$0 70
1668.	" " " " 6" " 20 × 40 " " " " ..									70
1669.	" " " " 6" " 30 × 60 " " " " ..									70
1670.	" " " " 6" " 80 × 100 " " " " ..									90
1671.	" " " " 12" " 10 × 50 " " " " ..									1 15
1672.	" " " " 12" " 20 × 40 " " " " ..									1 15
1673.	" " " " 12" " 30 × 60 " " " " ..									1 15
1674.	" " " " 12" " 80 × 100 " " " " ..									1 50
1675.	" " " " 12" " 100 × 500 " " " " ..									1 25
1676.	" " " " 12" " 200 × 400 " " " " ..									1 25
1677.	" " " " 12" " 300 × 600 " " " " ..									1 25
1678.	" " " " 12" " 800 × 1000 " " " " ..									1 75
1679.	Flat white edge chain scale, 6", both sides beveled and divided 10, 20, 30 and 40 parts to the inch. This scale comes in a leather sheath and is less than one inch wide.....									Each, \$1 35

FLAT WHITE EDGE SCALES—Continued

OPPOSITE BEVEL WHITE EDGE SCALES

U. S. Standard. Machine Divided



No. 1682

Divided $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$ and 1" to the foot

No. 1680.	Opposite bevel white edge scale, 6".....	Each, \$0 70
1682.	" " " " 12".....	" 1 15

Divided: $\frac{3}{8}$, $\frac{1}{2}$, $1\frac{1}{2}$, and 3" to the foot

No. 1683.	Opposite bevel white edge scale, 6".....	Each, \$0 70
1684.	" " " " 12".....	" 1 15

OPPOSITE BEVEL WHITE EDGE CHAIN SCALES



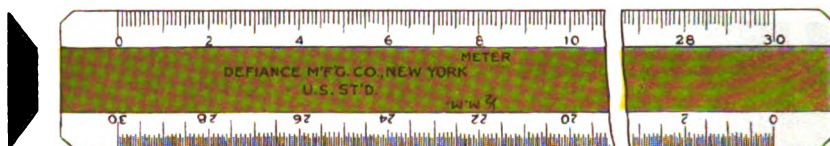
No. 1696

No. 1691.	Opposite bevel white edge chain scale, 6", divided 10×50 parts to the inch.....	Each, \$0 70
1692.	Opposite bevel white edge chain scale, 6", divided 20×40 parts to the inch.....	Each, 70
1693.	Opposite bevel white edge chain scale, 6", divided 30×60 parts to the inch.....	Each, 70
1694.	Opposite bevel white edge chain scale, 6", divided 80×100 parts to the inch.....	Each, 90
1696.	Opposite bevel white edge chain scale, 12", divided 10×50 parts to the inch.....	Each, 1 15
1697.	Opposite bevel white edge chain scale, 12", divided 20×40 parts to the inch.....	Each, 1 15
1698.	Opposite bevel white edge chain scale, 12", divided 30×60 parts to the inch.....	Each, 1 15
1699.	Opposite bevel white edge chain scale, 12", divided 80×100 parts to the inch.....	Each, 1 50

FLAT WHITE EDGE SCALES—Continued

FLAT WHITE EDGE METRIC SCALES

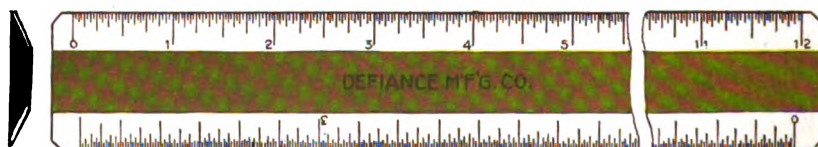
U. S. Standard. Machine Divided



No. 1706

No. 1704.	10 cm. long, divided mm. and half mm.....	Each, \$0 75
1705.	20 " " " " " " " "	" 1 00
1706.	30 " " " " " " " "	" 1 25
1707.	50 " " " " " " " "	" 2 25

DIAMETER AND CIRCUMFERENCE SCALE



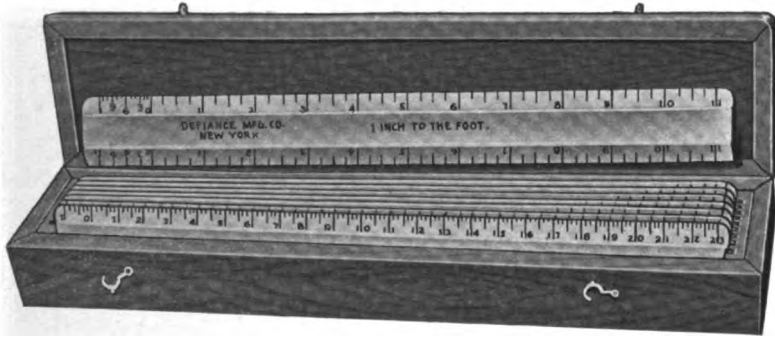
No. 1714

No. 1714.	Flat white edge scale, 12", divided for diameter and circumference.....	Each, \$1 75
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The divisions on this scale are in the ratio of the diameter to the circumference of a circle, one edge is divided in inches to 32nds, the other to spaces 3.1416 into 128ths.

BOXWOOD SCALES IN SETS

U. S. Standard. Machine Divided



No. 1724

OPEN DIVIDED SCALES IN SETS

These Scales have same Division on both edges, one edge reading from right to left, other from left to right.

- No. 1722. Set of 4 Boxwood Scales, 12",
Divided: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1" to the foot.....Per set, \$4 25
1724. Set of 8 Boxwood Scales, 12".
Divided: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1", $\frac{3}{8}$, $\frac{1}{2}$, 1 $\frac{1}{2}$, 3" to the foot..... " 7 50
1726. Set of 12 Boxwood Scales, 12".
Divided: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1", $\frac{3}{8}$, $\frac{1}{2}$, 1 $\frac{1}{2}$, 2, 3, 4, 6, 12" to the foot.... " 11 00

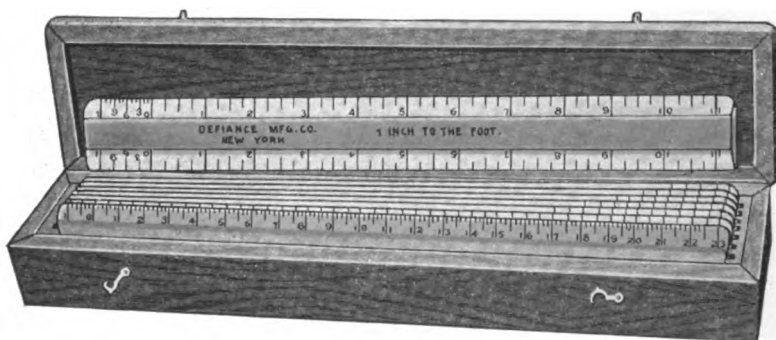
BOXWOOD SCALES IN SETS, Divided in 10ths

Each Scale has two different Divisions, one on each edge, numbered to read both ways.

- No. 1732. Set of 4 Boxwood Scales.
Divided: 10, 20, 30, 40, 50, 60, 80, 100 parts to the inch..Per set, \$4 70
1734. Set of 6 Boxwood Scales, one division on each edge.
Divided: 10, 20, 30, 40, 50, 60 parts to the inch..... " 6 00
1736. Set of 8 Boxwood Scales, one division on each edge.
Divided: 10, 20, 30, 40, 50, 60, 80, 100 parts to the inch.. " 9 00

WHITE EDGE SCALES IN SETS

U. S. Standard. Machine Divided



No. 1745

OPEN DIVIDED SCALES IN SETS

These Scales have same Division on both edges, one edge reading from left to right, other edge right to left.

- No. 1743. Set of 4 White Edge Scales, 12".
Divided: $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, 1" to the foot.....Per set, \$6 25
1745. Set of 8 White Edge Scales, 12".
Divided: $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, 1", $\frac{3}{8}$, $\frac{1}{2}$, $1\frac{1}{2}$, 3" to the foot..... " 11 50
1747. Set of 12 White Edge Scales, 12".
Divided: $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, 1", $\frac{3}{8}$, $\frac{1}{2}$, $1\frac{1}{2}$, 2, 3, 4, 6, 12" to the foot.... " 17 00

WHITE EDGE SCALES IN SETS

Dividend in 10ths

Each Scale has two different Divisions, one on each edge, numbered to read both ways.

- No. 1753. Set of 4 White Edge Scales.
Divided: 10, 20, 30, 40, 50, 60, 80, 100 parts to the inch..Per set, \$6 75
1755. Set of 6 White Edge Scales, one division on each side.
Divided: 10, 20, 30, 40, 50, 60 parts to the inch..... " 9 00
1757. Set of 8 White Edge Scales, one division on each edge.
Divided: 10, 20, 30, 40, 50, 60, 80, 100 parts to the inch.. " 13 00

TRIANGLE BOXWOOD SCALES

U. S. Standard. Machine Divided

FOR ARCHITECTS AND
MECHANICAL ENGINEERS



Regular Shape



Improved Concave
Shape.



No. 1771

Triangular Boxwood Scales

Divided: $\frac{3}{8}$, $\frac{5}{16}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, 3" to the foot, and one edge 16 to the inch.

Regular shape.			Improved concave shape.		
No. 1770.	6"	Each, \$0 50	No. 1776.	6"	Each, \$0 75
1771.	12"	" 75	1777.	12"	" 1 00
1772.	18"	" 2 40	1778.	18"	" 2 50
1773.	24"	" 4 20	1779.	24"	" 4 50

Triangular Boxwood Scales

Divided: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, 2, 3, 4" to the foot, and one edge 16 to the inch.

Regular shape.			Improved concave shape.		
No. 1782.	12"	Each, \$0 75	No. 1787.	12"	Each, \$1 00
1784.	18"	" 2 40	1788.	18"	" 2 50
1786.	24"	" 4 20	1789.	24"	" 4 50

FOR CIVIL ENGINEERS AND SURVEYORS



No. 1796

Triangular Boxwood Scales

Divided: 10, 20, 30, 40, 50, 60 parts to the inch.

Regular shape.			Improved concave shape.		
No. 1795.	6"	Each, \$0 50	No. 1806.	6"	Each, \$0 75
1796.	12"	" 75	1807.	12"	" 1 00
1797.	18"	" 2 40	1808.	18"	" 2 50
1800.	24"	" 4 20	1809.	24"	" 4 50

Triangular Boxwood Scales

Divided: 20, 30, 40, 50, 60, 80 parts to the inch.

Regular shape.			Improved concave shape.		
No. 1815.	12"	Each, \$0 90	No. 1820.	12"	Each, \$1 25
1816.	18"	" 2 40	1823.	18"	" 2 50
1818.	24"	" 4 20	1824.	24"	" 4 50

TRIANGULAR BOXWOOD METRIC SCALES

Divided: .01, .02, .03, .05, .025, .0125.

No. 1828.	Triangular Boxwood Scale,	20 cm. long, regular shape..	Each, \$1 20
1832.	"	" 30 " " " " " " " " " " " "	1 50
1834.	"	" 50 " " " " " " " " " " " "	2 70

TRIANGULAR WHITE EDGE SCALES



Regular Shape

U. S. Standard. Machine Divided
Our **Triangular White Edge Scales** are made in two styles, regular and improved concave shape. The value of the improved concave shape is that the visual angle is such that it affords an easier reading of the scales. Each style has its advantages and the user can best determine which style he prefers.



Improved Concave Shape

FOR ARCHITECTS AND MECHANICAL ENGINEERS



No. 1842

Triangular White Edge Scales

Divided: $\frac{3}{32}$, $\frac{1}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, 3, and one edge 16 to the inch.

Regular shape.			Improved concave shape.		
No. 1840.	6"	Each, \$1 50	No. 1848.	6"	Each, \$1 50
1842.	12"	" 2 40	1850.	12"	" 2 40
1844.	18"	" 4 50	1852.	18"	" 4 50
1846.	24"	" 6 50	1854.	24"	" 6 50

Triangular White Edge Scales

Divided: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1, $\frac{3}{4}$, $\frac{1}{2}$, $1\frac{1}{2}$, 2, 3, 4, and one edge 16 to the inch.

Regular shape.			Improved concave shape.		
No. 1860.	12"	Each, \$2 40	No. 1868.	12"	Each, \$2 40
1864.	18"	" 4 50	1870.	18"	" 4 50
1866.	24"	" 6 50	1872.	24"	" 6 50

ENGINEERS AND SURVEYORS CHAIN SCALE (White Edge)



No. 1882

Triangular White Edge Scales

Divided: 10, 20, 30, 40, 50, and 60 parts to the inch.

Regular shape.			Improved concave shape.		
No. 1880.	6"	Each, \$1 50	No. 1884.	6"	Each, \$1 50
1881.	12"	" 2 40	1885.	12"	" 2 40
1882.	18"	" 4 50	1886.	18"	" 4 50
1883.	24"	" 6 50	1887.	24"	" 6 50

Triangular White Edge Scales

Divided: 20, 30, 40, 50, 60, and 80 parts to the inch.

Regular shape.			Improved concave shape.		
No. 1901.	12"	Each, \$2 50	No. 1904.	12"	Each, \$2 50
1902.	18"	" 4 50	1905.	18"	" 4 50
1903.	24"	" 6 50	1906.	24"	" 6 50

TRIANGULAR WHITE EDGE METRIC SCALES

Divided: .01, .02, .03, .05, .025, .0125.

No.	Triangular White Edge Scale, 20 cm. long, div.,	Each
1910.	regular shape	\$2 00
1911.	" " " " 30	2 50
1912.	" " " " 50	5 00

TRIANGULAR METALLIC SCALES

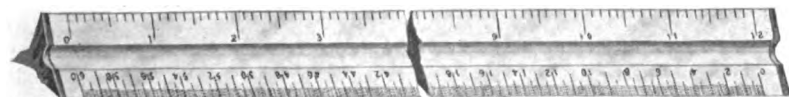
Regular Shape



No. 1914

- No. 1914. Triangular Metallic Scale, Architects', 12", divided $\frac{3}{32}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, 1 , $1\frac{1}{2}$, 3" to the foot, $\frac{1}{16}$ " Each, \$2 50
1915. Triangular Metallic Chain Scale, Engineer's, 12"; divided: 10, 20, 30, 40, 50, 60 parts to the inch.....Each, 2 50
1916. Triangular Metallic Chain Scale, Engineers', 12"; divided: 20, 30, 40, 50, 60, 80 parts to the inch.....Each, 2 50--

Improved Shape.

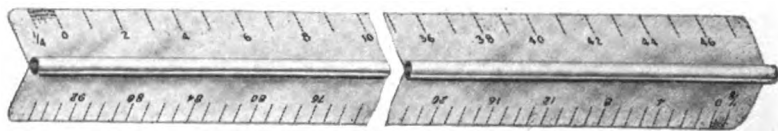


No. 1918

These Metallic Scales besides having the Improved Facet shape, which affords an easier reading of the scales, have the three fillets colored respectively, black, yellow and red, to facilitate finding the required division.

- No. 1918A. Improved Triangular Metallic Scale, Architects', 12"; divided: $\frac{3}{32}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, 1 , $1\frac{1}{2}$, 3" to the foot; $\frac{1}{16}$ "....Each, \$3 00
- 1918B. Improved Triangular Metallic Scale, Engineers', 12"; divided: 10, 20, 30, 40, 50, 60 parts to the inch..... " 3 00
- 1918C. Improved Triangular Metallic Scale, Engineers', 12", divided: 20, 30, 40, 50, 60, 80 parts to the inch..... " 3 00

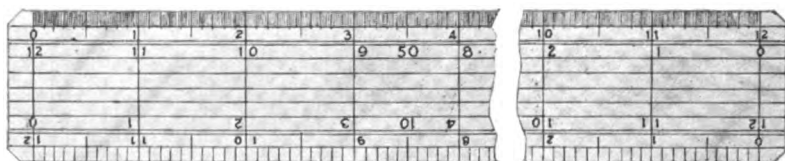
TRIANGULAR METALLIC SCALES—Continued



No. 1919A

The form of these scales makes them very convenient for many purposes. They are made of steel nicked with a dull finish, a 12" scale weighs 2½ ounces. Each scale has two graduations, one on each edge.

No. 1919A.	Metal Scale, 12", div., $\frac{1}{8} \times \frac{1}{4}$ " to the foot.....	Each, \$1 25
1919B.	" " 12" " $\frac{1}{4} \times \frac{1}{2}$ " " " "	" 1 25
1919C.	" " 12" " $\frac{3}{8} \times \frac{1}{8}$ " " " "	" 1 25
1919D.	" " 12" " $\frac{1}{2} \times 1$ " " " "	" 1 25
1919E.	" " 12" " $\frac{3}{4} \times 1\frac{1}{2}$ " " " "	" 1 25
1919F.	" " 12" " $1\frac{1}{2} \times 3$ " " " "	" 1 25



No. 1920B

No. 1920A.	Flat Transparent Amber, Underwriter's Scale, 6", both edges beveled and divided 10×50 parts to the inch....	Each, \$1 50
1920B.	Flat Underwriter's Scale, like No.1920A, but 12".....	" 2 00

PLOTTING SCALES

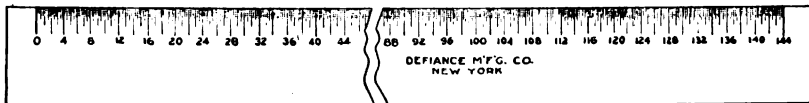


No. 1921

- No. 1921. Boxwood Plotting Scales, 6".....Each, \$0 15
 1922. Ivory Plotting Scales, 6"..... " 85

PAPER SCALES

Printed on Bristle Board. Engine Divided



No. 1930

- No. 1930. Card Board Scales, 18" long, full divided in $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, 3" to the foot.....Per set of these 8 scales, \$1 50
 Single scales 20
 1931. Card Board Scales, 18" long, full divided in 10, 20, 30, 40, 50, 60 parts to the inch.....Per set of these 6 scales, 1 10
 Single scales 20
 1932. Metric Paper Scales, $\frac{1}{2}$ meter long, divided in mm.....Each, 20
 1933. Metric and Inch Comparing Scale, $\frac{1}{2}$ meter long..... " 30
 1934. Scale of Proportional Inches, 12" long, divided: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1. " 10

TRIANGULAR SCALE GUARDS



No. 1940

- No. 1940. Triangular Scale Guard, nickel plated.....Each, \$0 15

MAP MEASURES



No. 1950

No. 1950. Universal Map Measures, with Handle. The Index hand registers inches to miles, or centimetres to kilometers.....Each, \$3 00



No. 1951

No. 1951. Map Measure, watch pattern dial with two graduations; 12 inches in eighths, and 25 feet marked every foot....Each, \$2 15

To measure a line first set the instrument to 0, then holding the instrument vertically, follow the line carefully in one direction by the small projecting tracer wheel. The length of the line in feet, inches and eighths will be indicated by the index hands on the dial.

White Enamel Finish



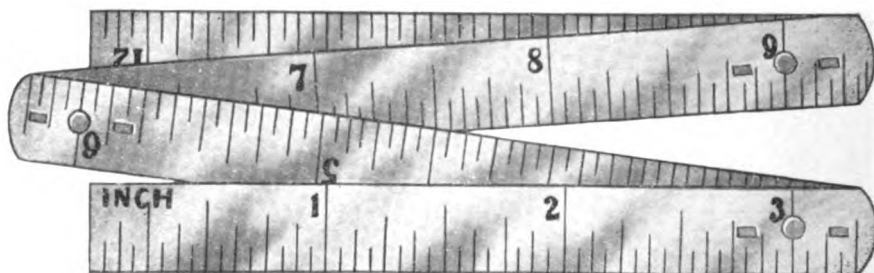
Yellow Enameled Finish

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FOLDING FLEXIBLE STEEL POCKET RULES

WITH PATENT STOP JOINTS

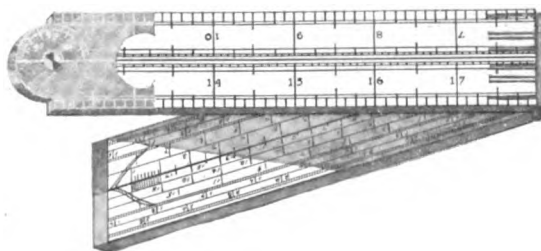
Three-fourths inch wide, accurately graduated on both sides, raised figures. With patent stop joints, which hold rule true and rigid when extended.



No. 1970-1

No. 1970-1.	4 fold, divided	1-16 × 1-16"	Each, \$0 25
1970-2.	8 "	" 1-16 × 1-16"	" 50
1970-3.	12 "	" 1-16 × 1-16"	" 75
1970A.	Leather Sheath for No. 1970-1		" 10
1970B.	" "	" " 1970-2	" 12
1970C.	" "	" " 1970-3	" 13

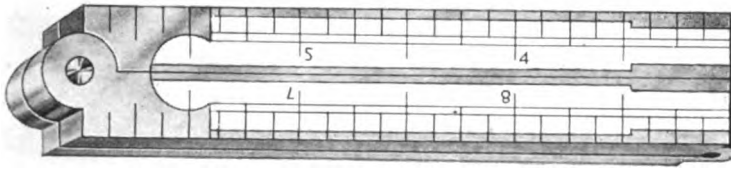
SCALE RULES



No. 1971

No. 1971.	Ivory Joint Rule, 2 feet, 4 fold, German Silver mounted, divided $\frac{1}{8}$, $\frac{1}{10}$, $\frac{1}{12}$, $\frac{1}{16}$ ", outside edge foot in 100ths. Inside edges beveled and divided, $\frac{1}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1 , $1\frac{1}{2}$, $1\frac{1}{2}$ " to the foot. Main joint graduated to 5 degrees for setting off angles.....	Each, 7 50
1972.	Boxwood Joint Rule, 2 feet, 4 fold, German Silver mounted, graduations like No. 1971.....	Each, 2 00
1973.	Boxwood Joint Rule, 2 feet, 4 fold, Brass mounted, with scales on beveled edge, graduated $\frac{1}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1 " to foot.....	Each, 1 35

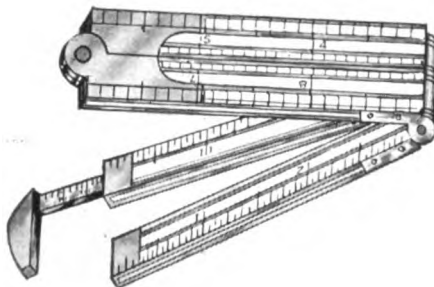
POCKET RULES



No. 1983

No. 1980.	Pocket Rule, Boxwood, 1 foot, 4 fold, Brass Mountings.....	\$0 12
1981.	" " " 2 " 4 " " "	15
1982.	" " " 1 " 4 " " Bound Edges.....	35
1983.	" " " 2 " 4 " " " "	50
1984.	Pocket Rule, Ivory, 1 foot, 4 fold, German Silver Mountings	1 00
1985.	" " " 2 " 4 " " " "	3 50
1986.	" " " 1 " 4 " " " Bound Edges	2 00
1987.	" " " 2 " 4 " " " " "	5 00

CALIPER RULES



No. 1990

No. 1990.	Pocket Caliper Rule, Boxwood, 1 foot, 4 fold, Brass Bound Edges	Each, \$0 60
1991.	Pocket Caliper Rule, Boxwood, 1 foot, 4 fold, Full Brass Brass Bound	Each, 1 00

EXTENSION MEASURES

No. 2000

In Two Sections, with Set Screws.

No. 1998.	Extension measure, 4 feet, extending to 8 feet.....	Each, \$2 25
1999.	" " 5 " " " 10 "	" 2 50
2000.	" " 6 " " " 12 "	" 3 00

No. 2003

In Three Sections, with Set Screws.

No. 2001.	Extension measure, 3 feet, extending to 9 feet.....	Each, \$4 00
2002.	" " 4 " " " 12 "	" 4 50
2003.	" " 5 " " " 15 "	" 5 50

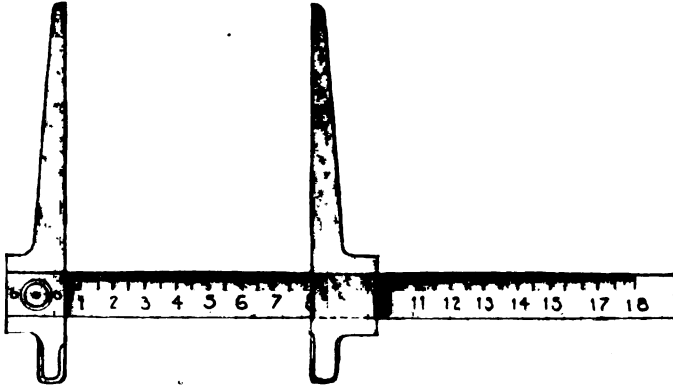
SHRINKAGE RULES



No. 2010

No. 2010.	Shrinkage Rule, 24 $\frac{1}{2}$ "	shrinkage, $\frac{1}{8}$ per foot.....	Each
2011.	" " 24 $\frac{1}{2}$ "	" $\frac{1}{8}$ "	1 20
2012.	" " 24 $\frac{3}{4}$ "	" $\frac{3}{8}$ "	1 20
2013.	" " 24 $\frac{1}{2}$ "	" $\frac{1}{4}$ "	1 20
2014.	" " 25 "	" $\frac{1}{2}$ "	1 20
2015.	" " 25 $\frac{1}{2}$ "	" $\frac{3}{4}$ "	1 20
2016.	" " 26 "	" 1 "	1 20

FORESTERS' CALIPERS



No. 2020

No. 2020. Tree Calipers, fine Hardwood, 18" 1 clamp nut.....Each, \$3 15

2020A.	"	"	"	"	24"	2	"	nuts.....	"	3 65
2020B.	"	"	"	"	30"	2	"	"	"	4 15
2020C.	"	"	"	"	50"	2	"	"	"	5 45

SLIDE RULES

The Slide Rule in its present perfected form is one of the simplest and quickest Instruments for solving problems of multiplication and division and powers and roots without the tedium of mental effort.

The Slide Rule is not only indispensable to the Engineer and Scientist, but also to the manufacturer, accountant, cost clerk and any others who may have to compute simple or intricate calculations.

The various style Rules as listed in the following pages have been selected as representing the most desirable for all purposes, after a very careful test and examination of all types.

They are made of the very best seasoned Mahogany with white Celluloid facings.

The graduations are all engine divided and the markings will be found to be particularly sharp and well defined, thus ensuring very easy reading. Particular care has been taken to graduate the various scales in alignment.

Due to the many objections which have often arisen to the Slide Rule, we have, as far as possible embodied all the desirable features and eliminated the objectionable ones, in the design of our Rules.

Mannheim Style of Slide Rule was originated by Lieut. Mannheim.

The lower scales (on the rule and on the slide) are single while the two upper scales are double.

There is a cursor (indicator) for determining coinciding points on the scales, which permits of working out extensive computation without taking intermediate readings.

On the under face of the slides are scales of sines, tangents and equal parts. The index mark on the under side of body of the rule permits of reading the scales on the under face of the slide without reversing it. The bottom of the rule has tables giving a number of settings and ratios.

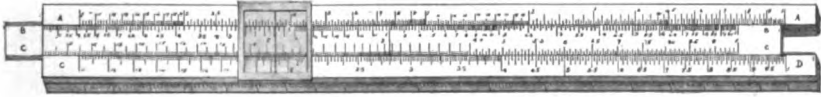
THE MULTIPHASE SLIDE RULE

The Multiphase Rule contains all the scales found in the regular Mannheim Rule with the following additions:

Scale B has a reciprocal scale enabling the user to compute compound multiplication or division at one setting.

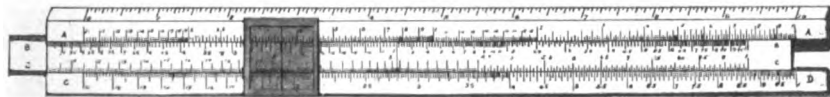
Squares, square roots, cubes, or cube roots can be instantly read without any setting by means of the cursor as same is equipped with indicator on lower side of Rule.

SLIDE RULES—Continued



No. 2052

										Each
No. 2050.	Multiphase Slide Rule,	5"	in case with book of instructions							\$4 50
2052.	"	"	"	10"	"	"	"	"	"	5 00
2054.	"	"	"	16"	"	"	"	"	"	10 00
2056.	"	"	"	20"	"	"	"	"	"	15 00



No. 2062

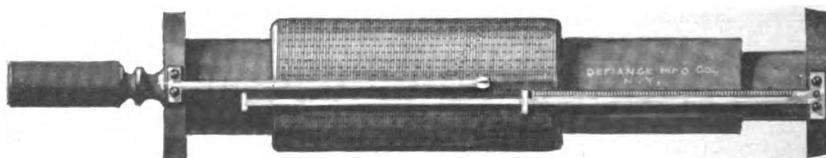
										Each
No. 2060.	Mannheim Slide Rule,	5"	in case with book of instructions							\$3 50
2061.	"	"	"	8"	"	"	"	"	"	4 00
2062.	"	"	"	10"	"	"	"	"	"	4 50
2063.	"	"	"	15"	"	"	"	"	"	9 50
2064.	"	"	"	20"	"	"	"	"	"	12 50

SLIDE RULES—Continued



No. 2084

- No. 2080. Faber's Slide Rules, 5", Mannheim Style, in case with book of instructionsEach, \$3 25
2082. Faber's Slide Rules, 10", Mannheim Style, in case with book of instructionsEach, 4 50
2084. Faber's Slide Rules, 10", Mannheim Style, with decimal indicator on cursor, in case with book of instructions.....Each, 4 50
2086. Faber's Slide Rule, 10", for Electrical and Mechanical Engineers' log scale, special cursor, in case with book of instructionsEach, 5 00
2088. Faber's Slide Rule, 20", Mannheim Style, with decimal indicator on cursor, in case with book of instructions.....Each 15 00



No. 2094

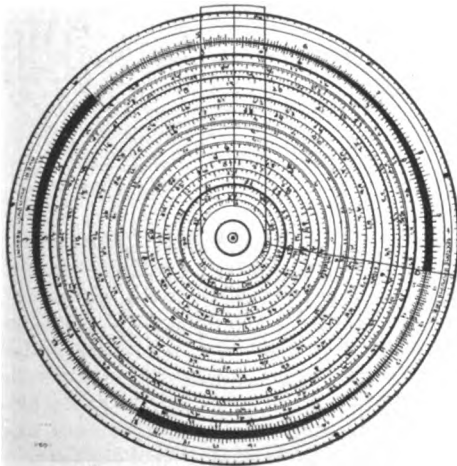
- Each
- No. 2094. Fuller's Spiral Slide Rule, in Mahogany box with directions, \$30 00

SUNDRIES FOR SLIDE RULES

No. 2100.	Glass Cursor, with one Hairline.....	Each, \$0 50
2102.	Glass Cursor, with two Hairlines.....	" 70
2104.	Magnifier	" 3 50
2106.	Sole Leather Case for 5" Slide Rules.....	" 60
2108.	" " " " 8" " "	" 70
2109.	" " " " 10" " "	" 80
2110.	" " " " 15" " "	" 1 00
2112.	" " " " 20" " "	" 1 35

SEXTON'S OMNIMETRE

Functions: Logarithms, Numbers, Squares, Square Roots, Cubes, Cube Roots, Sines, Tangents, Versed Sines and Secants.



No. 2120

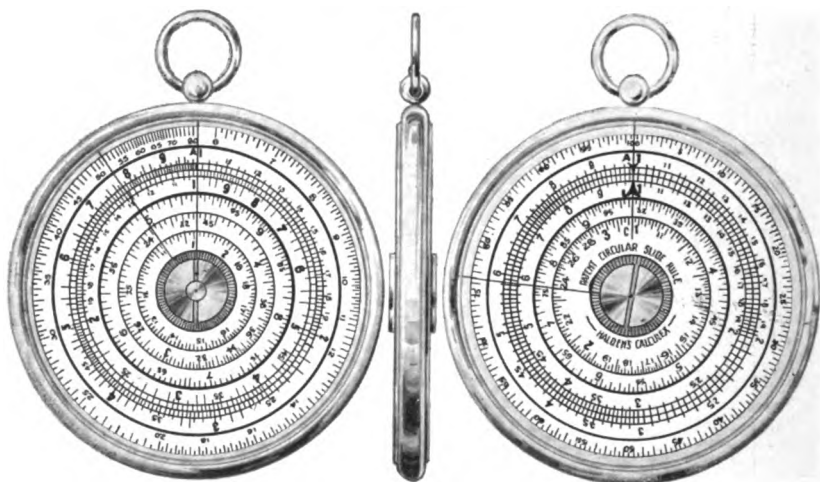
No. 2120. "Sexton's Omnimetre" No. 1, diameter $7\frac{1}{4}$ ", Bristol Board discs, reading from edge of runner.....Each, \$1 00

No. 2124. "Sexton's Omnimetre" No. 2, diameter $7\frac{1}{4}$ ", non-absorbent Card Discs, reading from Hairlined runner. Lower disc perforated to facilitate manipulation. Each, \$2 00

No. 2126. "Sexton's Omnimetre" No. 3, diameter 7", non-absorbent Bristol Board Discs, reading from Hairlined runner. Lower disc perforated to facilitate manipulation. Milled nut to clamp discs in position when required. Character of graduations gives increased ease of reading. Additional functions of fifth powers, fifth roots.

Each, \$3 00

THE IMPROVED HALDEN CALCULEX



No. 2150

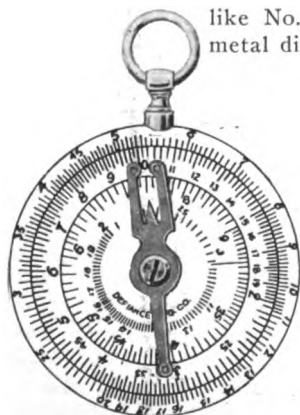
No. 2150. **"Improved Halden Calculex"** watch pattern, $2\frac{3}{8}$ " diameter, in leather case with book of instructions..... Each, \$5 00

No. 2160. **"The Boucher Calculator,"** constructed on the form of stem winding watch with double face, compound calculations can be easily performed on the calculator by means of the two pointers operated by the stem winder and indicating simultaneously on both dials. With enameled cardboard dials..... Each, \$8 50

No. 2164. **"Boucher Calculator,"** like No. 2160, but with silvered metal dials..... Each, \$14 00



No. 2160

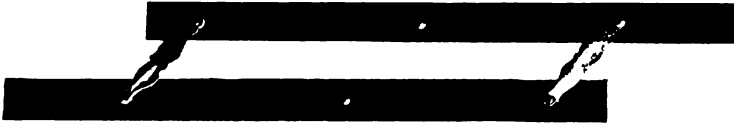


No. 2168

No. 2168. **"The Charpentier Calculator,"** consisting of German Silver disc, $2\frac{3}{8}$ " diameter, which forms the body of the rule, with a circular slide, is revolved and set by the handle. This instrument is read like an ordinary Slide Rule, scale against scale. Circular Scale equivalent to a straight rule $5\frac{1}{8}$ " long. Recommended on account of its compactness and not being affected by atmospheric changes.

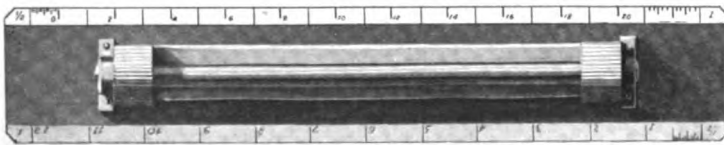
Each, \$5 00

PARALLEL RULES



No. 2173

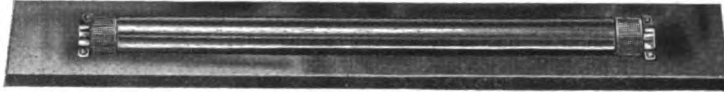
No. 2173.	Ebony Parallel Rules, nickel-plated bars, 6".....	Each, \$0 30
2174.	" " " " " 9".....	" 60
2175.	" " " " " 12".....	" 75
2176.	" " " " " 15".....	" 1 00
2177.	" " " " " 18".....	" 1 20
2178.	" " " " " 24".....	" 2 00
2179.	Hard Rubber Parallel Rules, nickel-plated bars, 6".....	" 75
2180.	" " " " " 9".....	" 1 00
2181.	" " " " " 12".....	" 1 20
2182.	" " " " " 15".....	" 1 50
2183.	" " " " " 18".....	" 1 75
2184.	" " " " " 24".....	" 2 40



No. 2190

No. 2190.	Hardwood Rolling Parallel Rule, nickel-plated mountings, white edges, divided $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1" to foot; 12".....	Each, \$5 00
2191.	Hardwood Rolling Parallel Rule, nickel-plated mountings, white edges, divided $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1" to foot; 15".....	Each, 6 50
2192.	Hardwood Rolling Parallel Rule, nickel-plated mountings, white edges, divided $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1" to foot; 18".....	Each, 7 50

PARALLEL RULES (Continued)



No. 2200

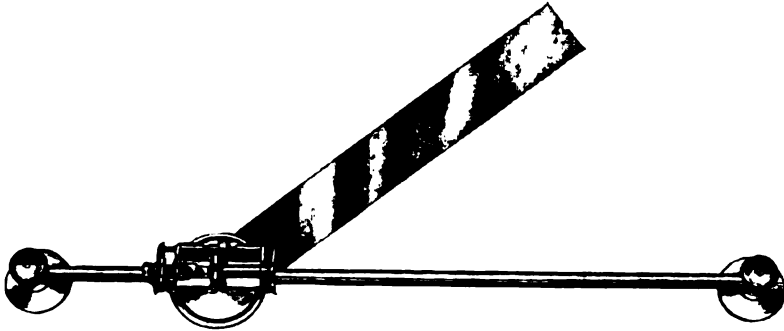
No. 2200.	Ebony Rolling Parallel Rules, brass mountings, 9"....	Each, \$2 75
2201.	" " " " " " 12"....	" 3 25
2202.	" " " " " " 15"....	" 3 75
2203.	" " " " " " 18"....	" 5 00



No. 2210

No. 2210.	Rolling Parallel Rule, German silver, 9".....	Each, \$8 50
2211.	" " " " " 12".....	" 10 00
2212.	" " " " " 15".....	" 12 00
2213.	" " " " " 18".....	" 15 00
2214.	" " " " " 24".....	" 20 00
2215.	" " " brass, 9".....	" 7 25
2216.	" " " " 12".....	" 8 50
2217.	" " " " 15".....	" 10 00
2218.	" " " " 18".....	" 12 00
2219.	" " " " 24".....	" 18 00

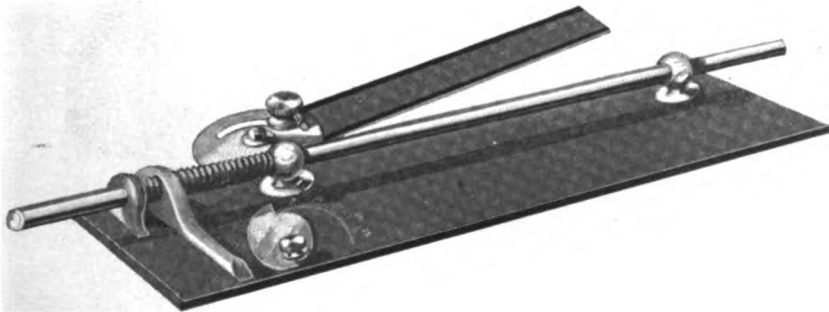
SECTION LINERS



No. 2225

- No. 2225. **Defiance** Section Liner, nickel-plated mountings, transparent amber arm.....Each, \$5 00

Very simple in construction, accurate and easy manipulation, permitting great range of spacing at any angle without changing position.

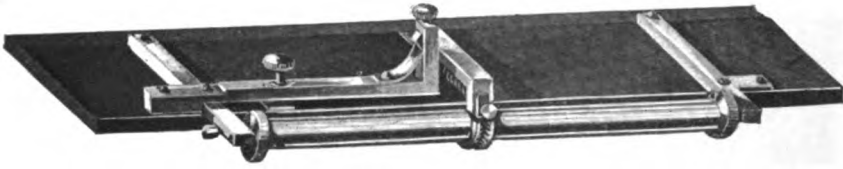


No. 2226

- No. 2226. **Sphinx** Section Liner, hardwood base, nickel-plated mountings.....Each, \$1 50

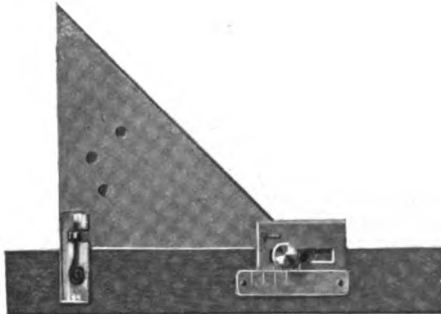
2227. **Sphinx** Section Liner, with celluloid lined blade..... " 2 00

SECTION LINERS (Continued)



No. 2228

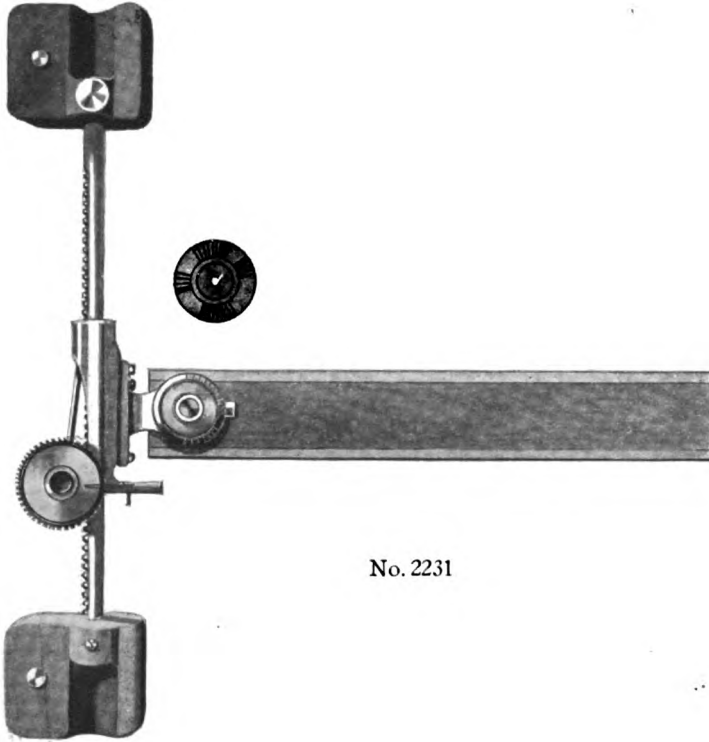
- No. 2228. Richter Section Liner, 10", of German silver, with ebony straight edge. In case.....Each, \$7 00
2229. Richter Section Liner, 10", like No. 2228, but with German silver straight edge and scale on rack for regulating space between lines. In case.....Each, 8 50



No. 2230

- No. 2230. Patent Section Liner, triangle of transparent amber, straight edge of hardwood, German silver mountings. A reliable and simple instrument requiring very little practice in manipulating. By the scale vernier the smallest spaces can be regulated.....Each, \$3 50

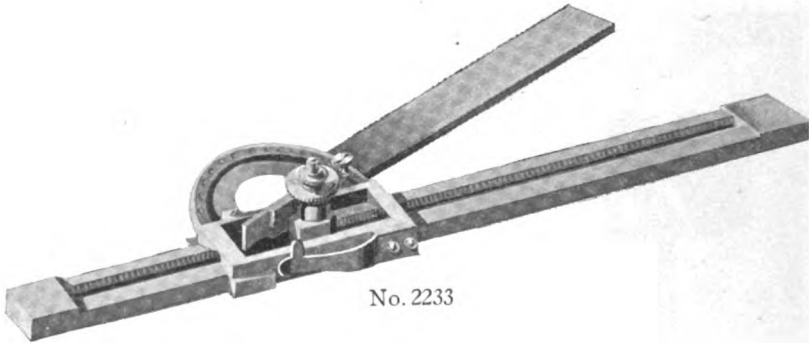
SECTION LINERS (Continued)



No. 2231

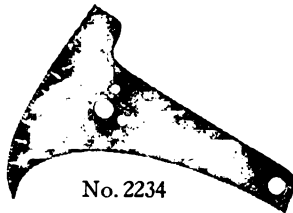
No. 2231.	Section Liner, blade 12" long.	In case.....	Each, \$6 50
2232.	" " " 14" " "	.....	" 7 50

SECTION LINER AND SCALE DIVIDER



- No. 2233. Section Liner and Scale Divider, German silver; base, 14 $\frac{1}{2}$.
Protractor graduated to degrees with vernier reading to
five minutes. In wooden case, with full directions for use.
Each, \$12 00

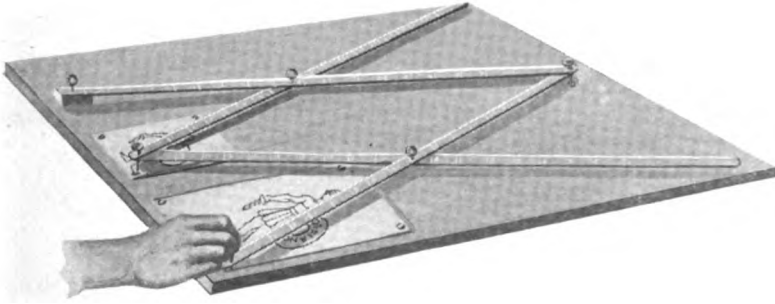
ODONTOGRAPH



- No. 2234. Templet Odontograph, for describing teeth of gear wheels.
A valuable instrument for mechanical drawing. In case, with
full directions.....Each, \$3 50

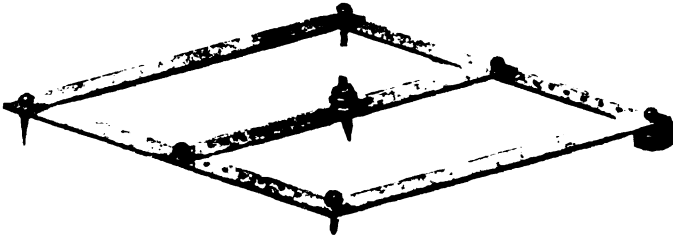
PANTOGRAPHS

For Enlarging and Reducing Drawings, Maps, etc.



No. 2240

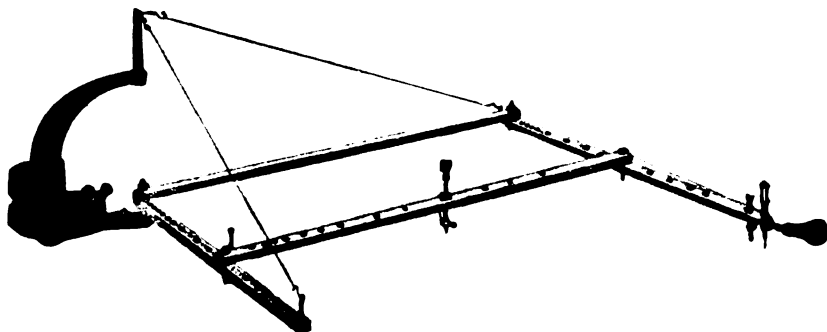
- No. 2240. Pantograph, pearwood bars, arms 41" long.....Each, \$5 00
 2241. Pantograph, like No. 2240, but arms 22" long..... " 4 00



No. 2242

- No. 2242. Pantograph, hardwood polished, arms 41" long, with black figures, brass mountings, elbow point wheel, pencil holder and movable pointEach, \$5 00
 2243. Pantograph, hardwood, like No. 2242, but with 21" arms. " 1 75
 2244. " plain finish, arms 21" long, brass mountings " 1 25
 2244½. " " " " 18" " 25

PRECISION SUSPENDED PANTOGRAPHS



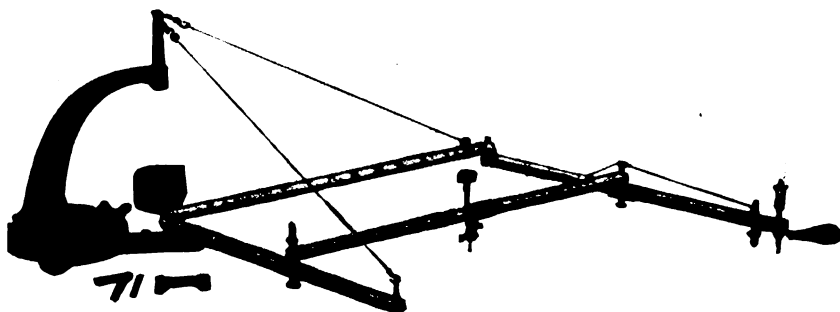
No. 2245

Suspended Pantograph, made of polished, seasoned pearwood bars, $\frac{1}{2}$ " by 1" thick for enlarging and diminishing in the following proportions:

$\frac{1}{20}, \frac{1}{12}, \frac{1}{10}, \frac{1}{8}, \frac{1}{6}, \frac{1}{5}, \frac{1}{4}, \frac{1}{3}, \frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}$.

The joints are made of polished steel cones in metal sockets and can be adjusted to any of the above ratios. Standard weight. Complete in hardwood box, with tracing point, steel point, pencil point, with 3 brass weights and box of leads.

No. 2245.	Length of arm, 28"	.....	Each, \$35 00
2246.	" " " 33"	.....	" 36 00
2247.	" " " 38"	.....	" 37 50



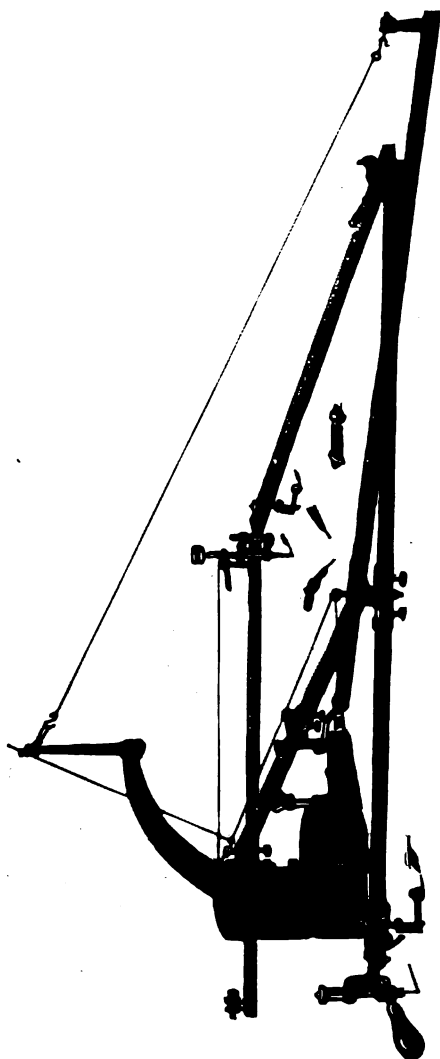
No. 2248

Suspended Pantograph, made of square hollow nicked-brass tubes, divided in millimetres. The edges of the slides beveled to allow of the proportions being adjusted without Verniers and Micrometer movement. For reducing and enlarging in all proportions from 1-20 to 4-5. The joints run on cone-shaped steel pivots, to insure an accurate and easy movement; simple control; no screws on the standard.

										Each
No. 2248.	Length of arm, 23 $\frac{1}{2}$ "	in polished case, with lock and handle								\$70 00
2249.	" " " 28 "	" " " " " " " " " " " "								75 00
2250.	" " " 33 "	" " " " " " " " " " " "								85 00
2251.	" " " 37 $\frac{1}{2}$ "	" " " " " " " " " " " "								95 00

PRECISION PANTOGRAPHS—Continued

For reducing from 20:1 to 1:1, or enlarging from 1:1 to 1:20 in all ratios, or reproducing the original size.



No. 2252

Suspended Precision Pantograph, made of square hollow metal bar, connection by pivot joints. The bars are fully divided, with Verniers on the tubular slides and micrometer movement for adjusting the proportions. Supporting bar and appliances for interchanging the pole with the pencil point to reproduce the original size. Convenient controlling arrangement for operating the pencil from the tracing point. Solid iron standard, with 2 extra weights, 2 leveling screws, and 2 spirit levels to adjust the instrument to a horizontal position. Instrument complete with adjustable tracing point, 2 steel points, pencil point with 3 brass weight, spirit level and instructions for use.

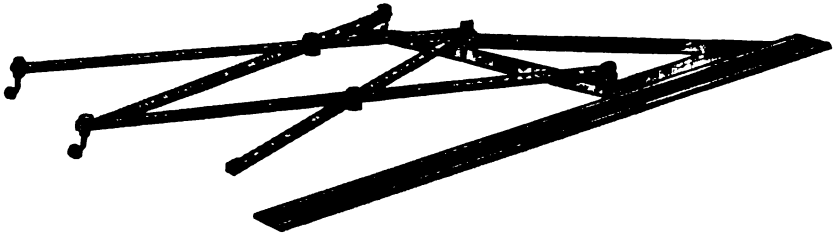
In polished wooden case with lock and key.

No. 2252. Suspended Precision Pantograph, with metal bars 33" long Each, \$160 00

No. 2253. Suspended Precision Pantograph, with metal bars 38" long..... Each, \$170 00

No. 2254. Suspended Precision Pantograph, like No. 2253, but with reading glass.
Each, \$182 00

THE BOSTON UNIVERSAL PANTOGRAPH



No. 2255

No. 2255. Boston Universal Pantograph, of German Silver, with 18"
Transparent Amber Triangle, in box, with directions..Each, \$45 00

The Boston Universal Pantograph has been designed in order to combine, at a reasonable cost, the accuracy of very expensive and intricate instruments with the simplicity and handiness of cheap ones. The expectations have been more than fulfilled, inasmuch as the Boston Universal, besides combining the good qualities of former constructions, possesses some new ones of its own, and furthermore, in reducing and enlarging, covers a field never before attempted.

It is of the most simple construction, made of German Silver throughout, with the minutest care, and in principle somewhat similar to the ordinary wooden pantograph, and requires, therefore, only a moment to be set to the desired proportion, ready for use.

The pivotal point is mounted on a celluloid triangle which may be placed anywhere on the most delicate drawing without injuring it, and a few weights will secure its position as well as will the commonly used screws or claws.

The center of the pivot is placed exactly over the right-angled corner of the triangle and can, therefore, easily be marked on the plan, making it possible:

1st. To remove the Pantograph entirely and replace it as often as desired.

2d. To change the position of the triangle and still keep the same pivotal point, thus gaining access to that part of the drawing which the triangle may have covered at first, and obtaining a copy of the entire drawing within the sweep of the Pantograph (a circle 8 feet in diameter) without leaving any "bald spots" to be covered separately.

3d. To move the pivotal point from place to place on the plan in the systematic manner, and thus reduce or enlarge plans of unlimited size and still get the copy in one piece.

In addition to its use for plain reducing and enlarging, the Boston Universal Pantograph covers a new field in being able to give a copy of a drawing distorted in a systematic manner, making the Pantograph adapted to a variety of purposes more readily imagined than enumerated. These results are obtained by sliding the triangle on which the pivot is mounted along a straight edge, keeping one side of the triangle against the tracer and consequently against the pencil. In this way the scale parallel to the straight edge is retained and the scale at right angles (or 45 degrees) thereto is changed. An easily acquired familiarity with the Pantograph will suggest a wide range of possibilities.

BOXWOOD AND IVORY PROTRACTORS



No. 2260

- No. 2260. Boxwood Protractor, 6" long, 1½" wide, scales of ½, ⅓, ⅔, 1" to the foot. Scale of chords; diagonal scales.....Each, \$0 35
- No. 2261. Square Ivory Protractor, 6" long, 1½" wide; divided: whole degrees, ½, ⅓, ⅔, 1" scales, scale of chords, diagonal scale, scales of 25, 30, 35, 40, 45 parts per inch.....Each, 1 60
- No. 2262. Square Ivory Protractor, 6" long, 1½" wide; divided: whole degrees, ½, ⅓, ⅔, 1" scales, scale of chords, diagonal scale, scales of 30, 35, 40, 45, 50, 60 parts per inch.....Each, 2 00
- No. 2263. Square Ivory Protractor, 6" long, 2" wide; divided: whole degrees, ½, ⅓, ⅔, 1" scales, scale of chords, diagonal scale, scales of 30, 35, 40, 45, 50, 60 parts per inch. Each, 4 25

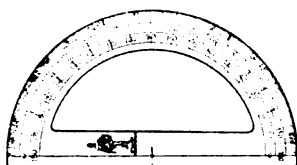
PAPER PROTRACTORS

- No. 2264. Circular Protractor, on Drawing Paper, 8" diam., ½°. Each, \$0 20
2265. " " " " " 14" " ¼° " 30
2266. " " " Bristol Board, 8" " ½° " 20
2267. " " " " " 14" " ¼° " 40
2268. " " " Tracing Paper, 8" " ½° " 20
2269. " " " " " 14" " ¼° " 30

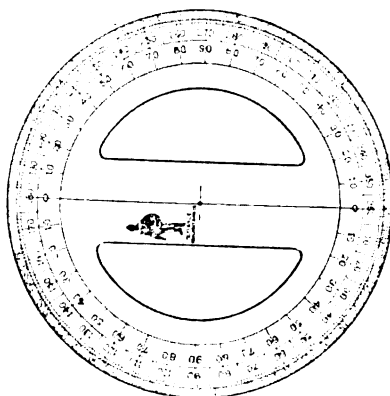
TRANSPARENT AMBER PROTRACTORS

2270. Semicircular Amber Protractor, 5" diam., ½°.....Each, \$0 45
2271. " " " 6" " ½°..... " 60
2272. " " " 7" " ½°..... " 70
2273. " " " 8" " ½°..... " 1 20
2274. Circular " " " 6" " ½°..... " 1 50
2275. " " " 8" " ½°..... " 2 25

TRANSPARENT AMBER PROTRACTORS WITH BEVELED EDGES



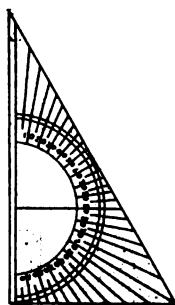
No. 2312



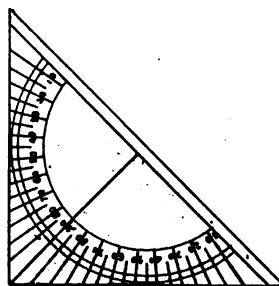
No. 2316

No. 2312.	Semicircular Amber Protractor,	6"	beveled edge,	$\frac{1}{2}^{\circ}$	...Each,	\$2 75
2314.	"	"	"	8"	"	3 50
2316.	Circular	"	"	6"	"	3 50
2318.	"	"	"	8"	"	4 50
2320.	"	"	"	10"	"	5 50

TRIANGLE AMBER PROTRACTORS



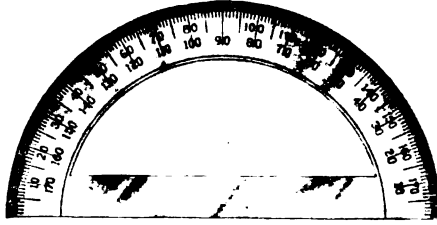
No. 2330



No. 2336

No. 2330.	Triangle Amber Protractor,	$30^{\circ} \times 60^{\circ}$,	5"	divided	to 1°	Each,	\$0 45
2332.	"	"	"	$30^{\circ} \times 60^{\circ}$,	6"	"	50
2334.	"	"	"	$30^{\circ} \times 60^{\circ}$,	7"	"	70
2336.	"	"	"	45°	5"	"	50
2338.	"	"	"	45°	6"	"	70
2340.	"	"	"	45°	7"	"	90

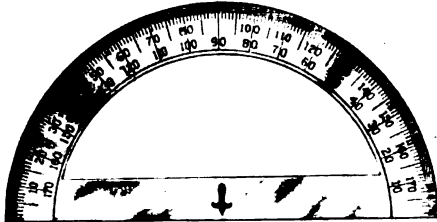
BRASS PROTRACTORS



No. 2342

No. 2342.	Semicircular, nickel plated, $3\frac{1}{2}$ " diameter, 1°	Each, \$0 08
2344.	" brass " $3\frac{1}{2}$ " " 1°	" 12
2346.	" " " $4\frac{1}{4}$ " " 1°	" 25
2348.	" " " $5\frac{1}{8}$ " " $\frac{1}{2}^\circ$	" 50
2350.	" " " $6\frac{1}{8}$ " " $\frac{1}{2}^\circ$	" 75

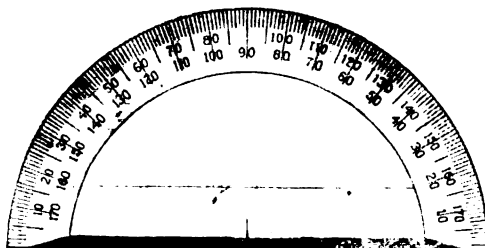
GERMAN SILVER PROTRACTORS



No. 2358

No. 2358.	Semicircular, German Silver, $4\frac{1}{4}$ " diameter, 1°	Each, \$0 50
2360.	" " " $5\frac{1}{8}$ " " $\frac{1}{2}^\circ$	" 75
2362.	" " " 6 " " $\frac{1}{2}^\circ$	" 80
2364.	" " " $6\frac{1}{8}$ " " $\frac{1}{2}^\circ$	" 90
2368.	" " " $7\frac{1}{4}$ " " $\frac{1}{2}^\circ$	" 1 20
2370.	" " " $8\frac{1}{2}$ " " $\frac{1}{2}^\circ$	" 1 50

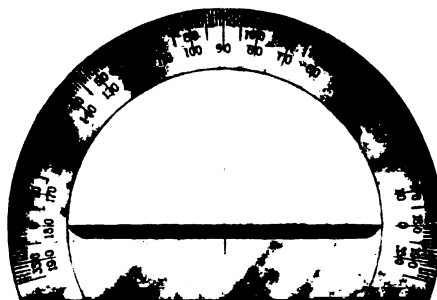
“DEFIANCE” PROTRACTORS



No. 2384

Center on Outer Edge

No. 2384.	Semicircular, German Silver, 4", beveled edge, 1°.....	Each, \$1 40
2386.	" " " 5", " " ½°.....	" 1 75
2388.	" " " 6", " " ½°.....	" 2 40
2390.	" " " 6", " " ¼°.....	" 3 00
2400.	" " " 7", " " ½°.....	" 3 25
2402.	" " " 8", " " ½°.....	" 4 15

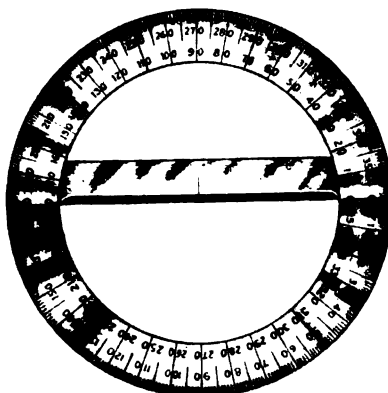


No. 2404

Center on Inner Edge

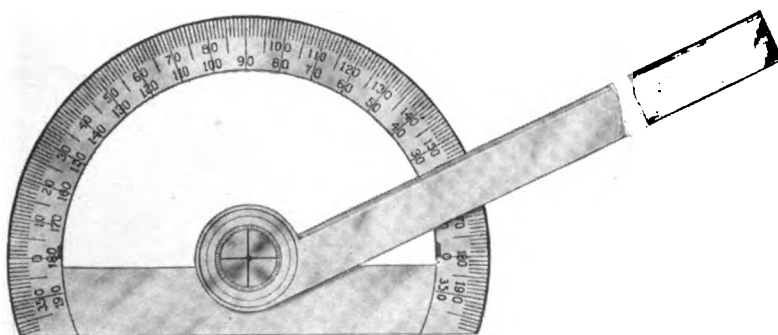
No. 2404.	Semicircular, German Silver, 4", beveled edge, 1°.....	Each, \$1 50
2406.	" " " 5", " " ½°.....	" 2 00
2408.	" " " 6", " " ½°.....	" 2 40
2410.	" " " 6", " " ¼°.....	" 3 00

“DEFIANCE” PROTRACTORS—Continued



No. 2412

No. 2412. Circular, German Silver, 5", $\frac{1}{2}^\circ$, beveled edge.....Each, \$5 50



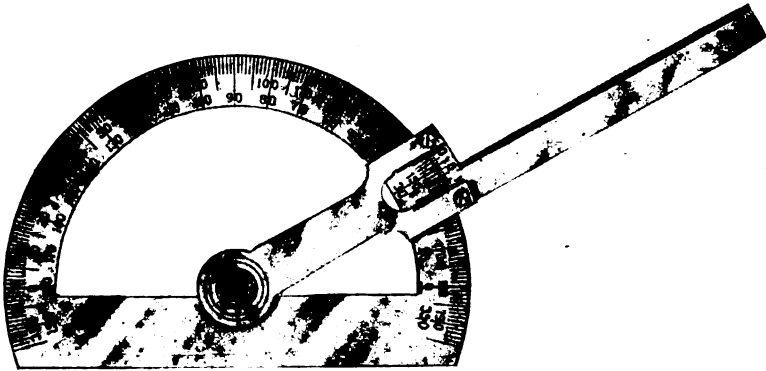
No. 2414

Semicircular, with Movable Arm and Horn Center

No. 2414. Semicircular, German Silver, 6", $\frac{1}{2}^\circ$, length of arm beyond outer edge, 6".....Each, \$8 25

2416. Semicircular, German Silver, 7", $\frac{1}{2}^\circ$, length of arm beyond outer edge, 6 $\frac{1}{2}$ ".....Each, 9 50

GERMAN SILVER PROTRACTORS



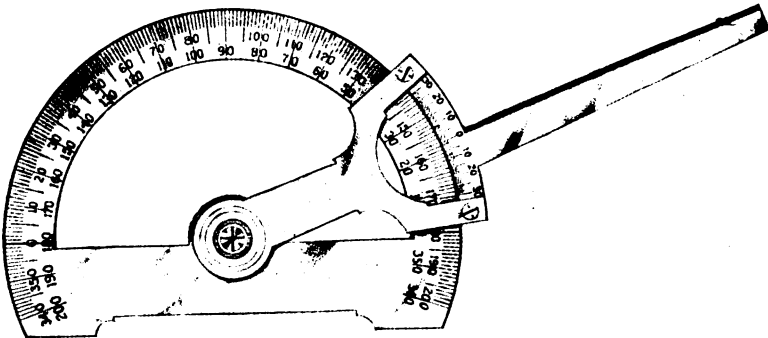
No. 2417

Semicircular with Vernier and Horn Center

No. 2417.	German Silver,	5", $\frac{1}{2}^\circ$,	Vernier reading to 3 min.....	Each,	\$10 00
2418.	"	8", $\frac{1}{4}^\circ$,	" " " 1 "	"	14 00
2419.	"	10", $\frac{1}{4}^\circ$,	" " " 1 "	"	16 50

Length of arm beyond outer edge of

Protractors	Nos. 2417, 5 $\frac{1}{2}$ "	2418, 6"	2419, 6 $\frac{1}{2}$ "
Morocco leather case, silk velvet lined.....	Each, \$3 50	\$4 00	\$4 50



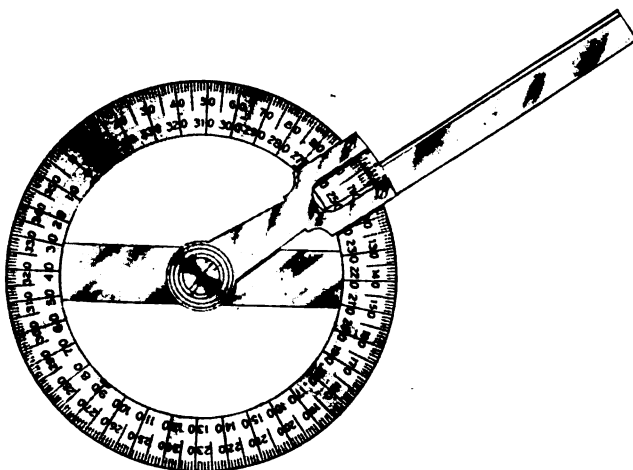
No. 2420

Semicircular with Vernier and Horn Center

No. 2420.	German Silver,	8", $\frac{1}{2}^\circ$,	Vernier reading to 1 min.....	Each,	\$16 00
2421.	"	10", $\frac{1}{2}^\circ$,	" " " 1 "	"	19 00

Length of arm beyond outer edge of Protractors.....	Nos. 2420, 6"	2421, 6 $\frac{1}{2}$ "
Morocco leather case, silk velvet lined.....	Each, \$4 00	\$4 50

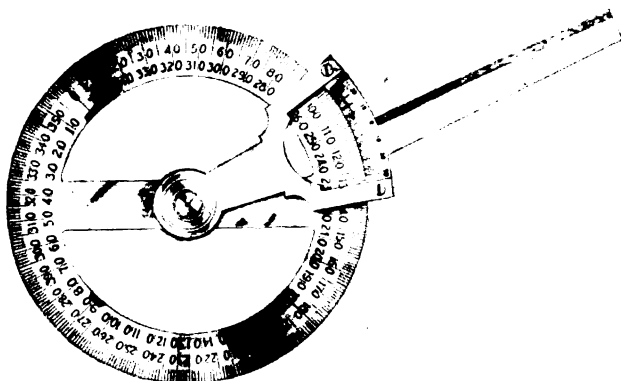
GERMAN SILVER PROTRACTORS—Continued



No. 2422

Circular with Vernier and Horn Center

No. 2422.	German Silver, $5\frac{1}{2}$ ", $\frac{1}{2}^\circ$,	Vernier reading to 3 min.....	Each, \$15 00
2424.	" " 8", $\frac{1}{4}^\circ$,	" " " 1 "	" 16 00
2426.	" " 10", $\frac{1}{4}^\circ$,	" " " 1 "	" 20 00
Length of arm beyond outer edge of			
Protractors	Nos. 2422, $5\frac{1}{2}$ "	2424, 6"	2426, $6\frac{1}{2}$ "
Morocco leather case, silk velvet lined.....	Each, \$4 00	\$4 50	\$5 00



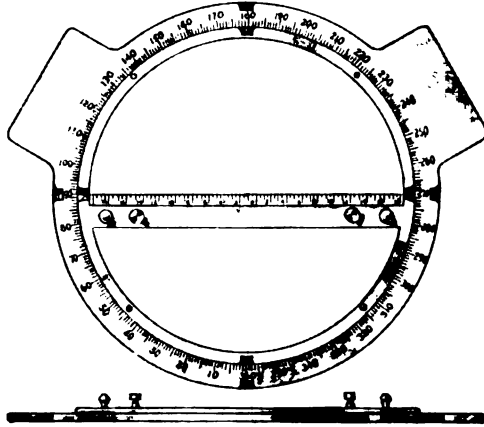
No. 2428

Circular with Vernier and Horn Center

No. 2428.	German Silver, 8", $\frac{1}{2}^\circ$,	Vernier reading to 1 min.....	Each, \$18 50
2430.	" " 10", $\frac{1}{2}^\circ$,	" " " 1 "	" 22 50
Length of arm beyond outer edge of Protractors.....			
		Nos. 2428, 6"	2430, $6\frac{1}{2}$ "
Morocco leather case, silk velvet lined.....		Each, \$4 50	\$5 00

COLBY'S PROTRACTOR

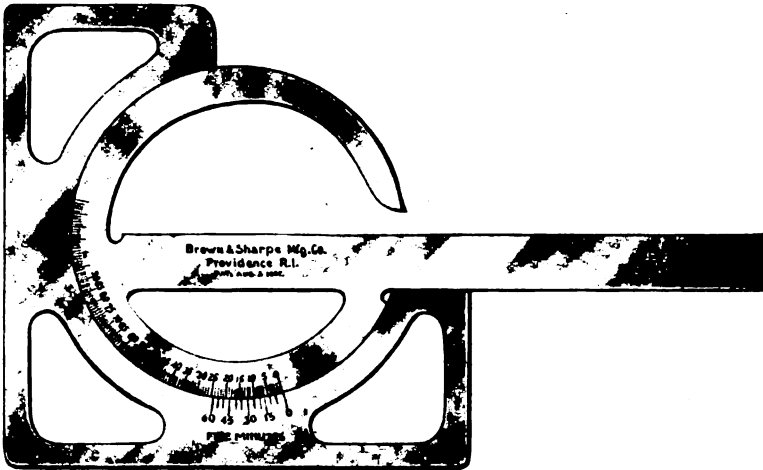
Patented Oct. 3, 1893



No. 2440

No. 2440. Colby's Protractor, German Silver, limb 12", divided to 15 minutes, scale graduated as required, in case.....Each, \$60 00

DRAFTSMAN'S PROTRACTOR



No. 2449

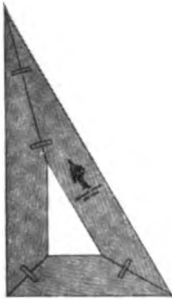
No. 2449. Draftsman's Steel Protractor, with directions.....Each, \$6 50
2450. " " " in morocco case..... " 7 75

This Protractor is made from sheet steel and has a blade $8\frac{1}{4}$ " long. The graduations read to degrees and the vernier reads to five minutes.

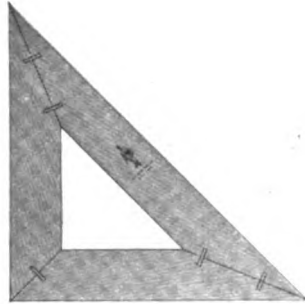
There are no projections on either face of the Protractor, and consequently it can be used on either edge of the blade or either side up. This makes it particularly convenient in dividing circles, transferring angles, drawing oblique lines at right angles to each other, or laying off given angles each side of a vertical or horizontal line without changing the setting.

WOODEN TRIANGLES

CHERRY OR MAPLE TRIANGLES WITH MORTISED CORNER JOINTS



No. 2501

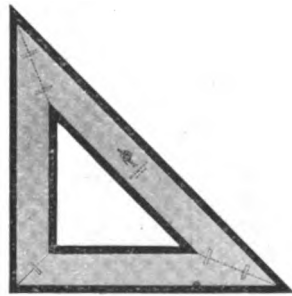


No. 2502

No. 2501.	Cherry, 30° × 60°	{ Size,	8"	10"	12"	14"
		{ Each,	\$0 12	\$0 16	\$0 20	\$0 24
2502.	Cherry, 45°	{ Size,	6"	8"	10"	12"
		{ Each,	\$0 12	\$0 16	\$0 20	\$0 24
2503.	Pearwood, 30° × 60°	{ Size,	8"	10"	12"	14"
		{ Each,	\$0 18	\$0 24	\$0 30	\$0 36
2504.	Pearwood, 45°	{ Size,	6"	8"	10"	12"
		{ Each,	\$0 18	\$0 24	\$0 30	\$0 36



No. 2505



No. 2506

No. 2505.	Hardwood lined Triangles, {	Size,	8"	10"	12"	14"	17"
	mortised joints, 30° × 60° .. {	Each,	\$0 25	\$0 30	\$0 40	\$0 50	\$0 75
2506.	Hardwood lined Triangles, {	Size,	6"	8"	10"	12"	14"
	mortised joints, 45° {	Each,	\$0 25	\$0 30	\$0 40	\$0 50	\$0 75

TRIANGLES (Continued)



No. 2507



No. 2508

- No. 2507. Mahogany, Ebony lined Triangle, mortised joints, $30^\circ \times 60^\circ$.
 Size..... 8" 10" 12" 14" 17" 20"
 Each..... \$0 35 \$0 40 \$0 55 \$0 75 \$1 20 \$1 50
2508. Mahogany, Ebony lined Triangle, mortised joints, 45° .
 Size..... 6" 8" 10" 12" 14" 17"
 Each..... \$0 35 \$0 40 \$0 55 \$0 75 \$1 20 \$1 50

BLACK TRIANGLES

Black Amber is far superior to hard rubber as it does not accumulate dust or smudge the drawing paper.



No. 2513



No. 2514

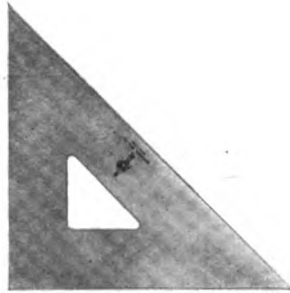
- No. 2513. Black Triangles, $30^\circ \times 60^\circ$.
 Size..... 4" 5" 6" 7" 8" 9" 10" 12" 14" 16" 18"
 Each..... \$0 15 20 25 30 35 40 45 60 1 00 1 50 2 00
2514. Black Triangles, $45^\circ \times 45^\circ$.
 Size..... 3" 4" 5" 6" 7" 8" 9" 10" 12" 14" 16"
 Each..... \$0 15 25 30 35 40 45 55 60 1 00 1 50 2 20

TRIANGLES (Continued)

TRANSPARENT AMBER TRIANGLES



No. 2517



No. 2518

No. 2517. Transparent Amber Triangles, $30^\circ \times 60^\circ$

Size.....	4"	5"	6"	7"	8"	9"	10"	11"	12"	14"	16"	18"
Each.....	\$0 20	30	35	40	50	60	70	80	95	1 55	2 35	3 20

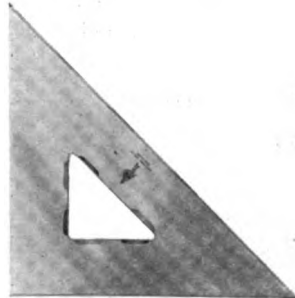
2518. Transparent Amber Triangles, 45° .

Size.....	3"	4"	5"	6"	7"	8"	9"	10"	12"	14"	16"
Each.....	\$0 25	30	40	50	60	70	90	1 05	1 55	2 10	3 00

TRANSPARENT AMBER TRIANGLES BEVELED ON INNER EDGE



No. 2517 N



No. 2518 N

No. 2517N. Transparent Amber Triangles, beveled on inner edge, $30^\circ \times 60^\circ$.

Size.....	4"	5"	6"	7"	8"	9"	10"	11"	12"	14"	16"	18"
Each.....	\$0 25	35	40	45	55	65	75	85	1 00	1 65	2 50	3 30

2518N. Transparent Amber Triangles, beveled on inner edge, 45° .

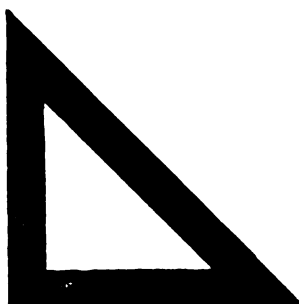
Size.....	3"	4"	5"	6"	7"	8"	9"	10"	12"	14"	16"
Each.....	\$0 30	35	45	55	65	75	95	1 10	1 65	2 20	3 15

TRIANGLES (Continued)

STEEL TRIANGLES



No. 2519 A



No. 2519 B

No. 2519A. Steel Triangles, nickel-plated, 30° × 60°.

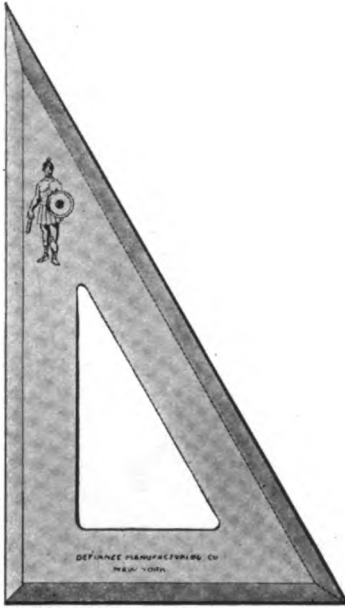
Size.....	6"	7"	8"	10"	15"
Each.....	\$3 20	3 50	3 85	4 25	6 50

2519B. Steel Triangles, nickel-plated, 45°.

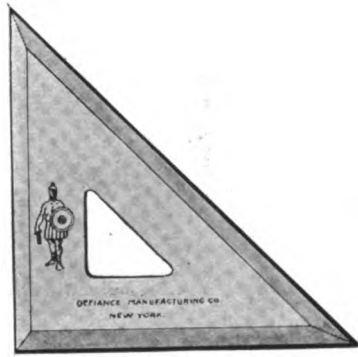
Size.....	5"	6"	8"	10"	12"
Each.....	\$3 20	3 50	4 25	5 50	6 50

TRIANGLES (Continued)

HIGH GRADE TRANSPARENT AMBER TRIANGLES



No. 2522



No. 2523

These triangles are all guaranteed not to warp, break or twist. They are perfectly made from the best, most transparent amber.

No. 2520. High Grade Transparent Amber Triangles, $30^\circ \times 60^\circ$, thick (.06), plain edges.

Size.....	5"	6"	7"	8"	9"	10"	12"	14"	15"	18"
Each.....	\$0 45	50	60	75	90	1 10	1 50	2 25	2 75	4 25

2521. High Grade Transparent Amber Triangles, 45° , thick (.06), plain edges.

Size.....	3"	4"	5"	6"	7"	8"	9"	10"	12"	15"
Each.....	\$0 35	45	60	75	90	1 10	1 50	2 25	2 75	4 00

2522. High Grade Transparent Amber Triangles, $30^\circ \times 60^\circ$, extra thick (.08), beveled edges.

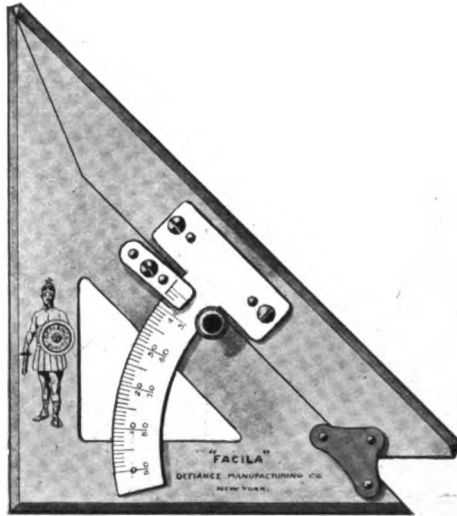
Size.....	5"	6"	7"	8"	9"	10"	12"	14"	15"	18"
Each.....	\$0 55	65	75	95	1 10	1 40	1 85	2 80	3 65	5 25

2523. High Grade Transparent Amber Triangles, 45° , extra thick (.08), beveled edges.

Size.....	3"	4"	5"	6"	7"	8"	9"	10"	12"	15"
Each.....	\$0 45	55	65	95	1 10	1 40	1 85	2 80	3 45	5 25

TRIANGLES (Continued)

THE "FACILA" UNIVERSAL ADJUSTABLE TRIANGLE



No. 2525A

The "Facila" Universal is a decided improvement on all existing types of triangles. The distinctive features, which readily appeal to the draftsman, are the white celluloid divided arc, which is read in conjunction with a transparent cursor, and the jointless edges of the square.

No. 2525. The "Facila" Universal Adjustable Triangle, medium thickness.

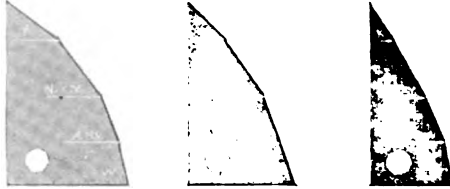
Size, arm.....	7"	10"	12"
Each.....	\$1 25	\$2 75	\$3 50

2525A. The "Facila" Universal Adjustable Triangle, extra thick, of particularly transparent celluloid, beveled.

Size, arm.....	7"	10"	12"	15"	18"
Each.....	\$1 75	\$3 25	\$4 00	\$5 75	\$8 25

TRIANGLES (Continued)

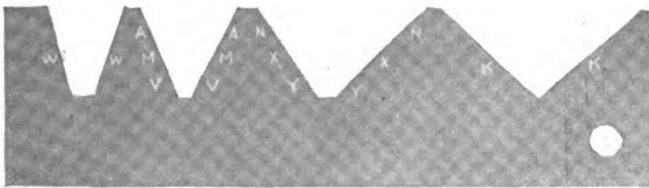
LETTERING TRIANGLES AND TEMPLETS



No. 2526

No. 2526. Lettering Templates, Transparent, set of 3. Per set..... \$1 50

TEMPLETS



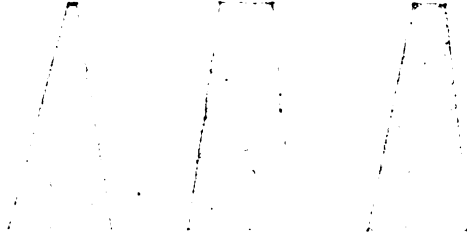
No. 2528

No. 2527. Lettering Angles, Black Celluloid, set of 3. Per set..... \$1 20

2528. " " Transparent Celluloid, set of 3. Per set.. 1 50

TRIANGLES (Continued)

EMBANKMENT ANGLES



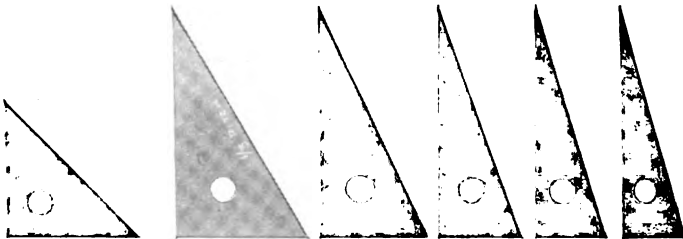
No. 2533

Three in a set, 6 slopes, $1 \times 4''$, $1 \times 5''$, $1 \times 6''$, $1 \times 8''$,
 $1 \times 10''$, $1 \times 12''$.

No. 2532. Embankment Angles, in Black Amber. Per set..... \$2 25

2533. " " " Amber. Per set..... 4 50

TRIANGLES FOR ROOF PITCH



No. 2537

No. 2536. Triangles for Roof Pitch, in Black Amber, set of 6. Per set. \$2 50

2537. " " " " " Amber, 6 in set. Per set..... 3 00

STRAIGHT EDGES



No. 2543

No. 2543. Cherry or Maple, straight edges, one edge beveled.

Size.....	18"	24"	30"	36"	42"	48"	54"	60"
Each.....	\$0 20	25	30	35	40	50	65	75



No. 2545

No. 2545. Ashwood, Maple Lined, straight edges, one edge beveled.

Size.....	24"	30"	36"	42"	48"	54"	60"	72"	84"	96"	120"
Each.....	\$0 35	40	45	55	65	80	90	1 00	2 75	3 75	5 00

MAHOGANY EBONY EDGES



No. 2548

No. 2548. Mahogany, Ebony edges, square edges.

Size.....	24"	30"	36"	42"	48"	54"	60"	72"
Each.....	\$0 45	50	55	70	85	1 05	1 25	1 40

STRAIGHT EDGES (Continued)



No. 2550

No. 2550. Mahogany or Maple Blade, Amber Lined, square edges.

Size.....	18"	24"	30"	36"	42"	48"	54"	60"
Each.....	\$0 75	1 00	1 25	1 50	1 80	2 20	3 25	4 00



No. 2553

No. 2553. Steel Straight Edges, nickel-plated, one edge beveled.

Size.....	15"	18"	24"	30"	36"	42"	48"	60"	72"
Each.....	\$1 75	2 00	3 00	4 00	5 00	6 50	8 00	11 00	15 00

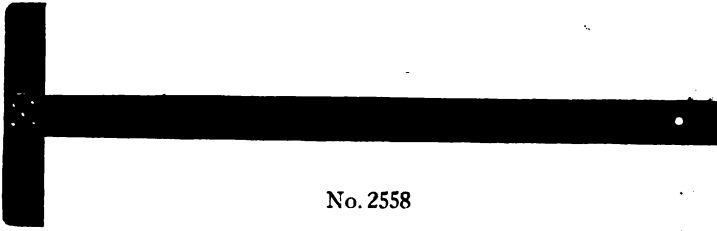


No. 2554

No. 2554. Steel Straight Edges, nickel-plated, square edges.

Size.....	15"	18"	24"	30"	36"	42"	48"	60"	72"
Each.....	\$1 10	1 25	1 90	2 75	3 50	4 50	6 00	8 50	12 00

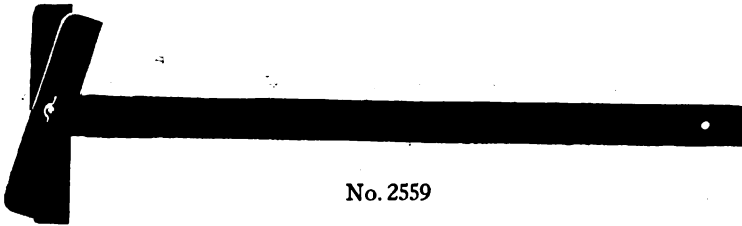
WOODEN T-SQUARES



No. 2558

Cherry Blade, fixed Head.

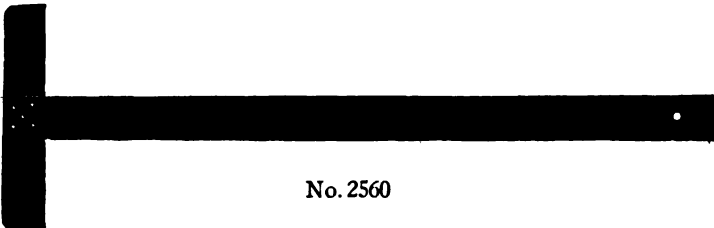
No. 2558.	Size.....	15"	18"	24"	30"	36"	42"	48"	54"
	Each.....	\$0 15	20	25	30	40	45	65	1 00



No. 2559

Cherry Blade, shifting Head and Swivel.

No. 2559.	Size.....	15"	18"	24"	30"	36"	42"	48"	54"
	Each.....	\$0 50	60	70	80	90	1 00	1 20	1 40

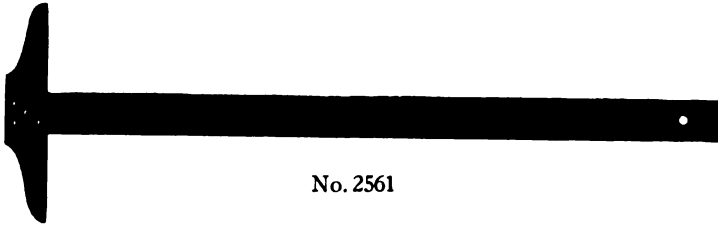


No. 2560

Pearwood, fixed Head.

No. 2560.	Size.....	15"	18"	24"	30"	36"	42"	48"	54"
	Each.....	\$0 25	30	35	45	55	65	90	1 25

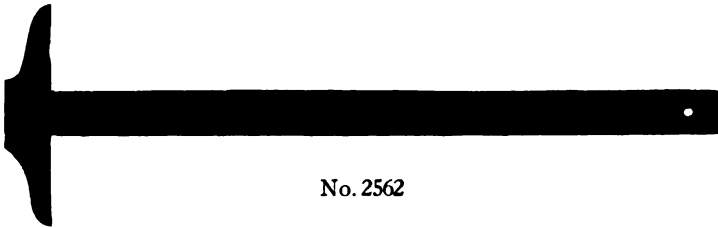
WOODEN T-SQUARES (Continued)



No. 2561

Maple Blade, Black Walnut fixed Head.

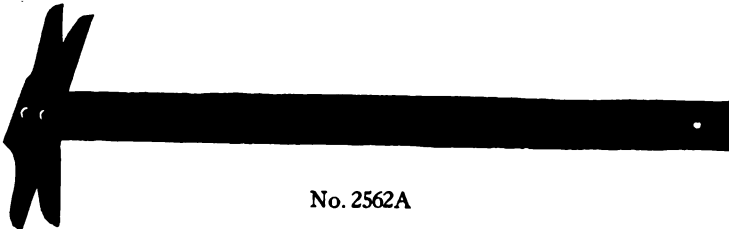
No. 2561.	Size.....	24"	30"	36"	42"	48"	54"	
	Each.....	\$0 60	75	90	1 05	1 20	1 40	



No. 2562

Ashwood Blade, Hardwood Lined, Walnut fixed Head.

No. 2562.	Size.....	24"	30"	36"	42"	48"	54"	60"	72"
	Each.....	\$0 75	90	1 05	1 25	1 50	1 75	2 25	3 00

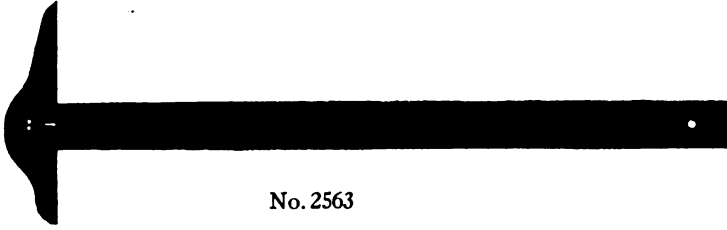


No. 2562A

Ashwood Blade, Hardwood Lined, Walnut shifting double Head.

No. 2562A.	Size.....	24"	30"	36"	42"	48"	54"	60"	72"
	Each.....	\$1 35	1 50	1 65	1 85	2 15	2 50	3 00	4 00

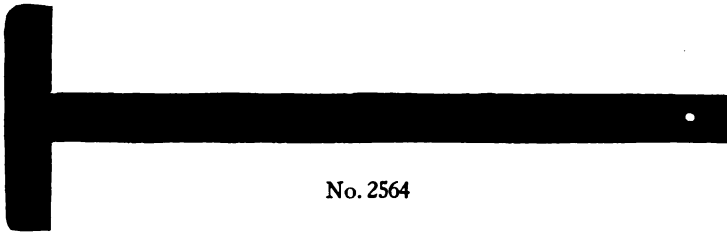
WOODEN T-SQUARES (Continued)



No. 2563

Ashwood Blade, Hardwood Lined, with improved nickel-plated clamping screw.

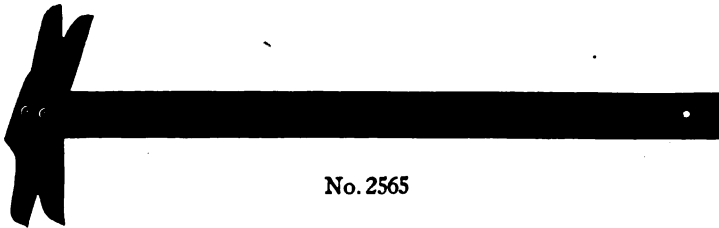
No. 2563.	Size.....	24"	30"	36"	42"	48"	54"	60"	72"
	Each.....	\$1 35	1 50	1 65	1 85	2 15	2 50	3 00	4 00



No. 2564

Mahogany, Ebony Lined Blade, fixed Head.

No. 2564.	Size.....	24"	30"	36"	42"	48"	54"	60"
	Each.....	\$0 90	1 10	1 30	1 50	1 75	2 10	2 60

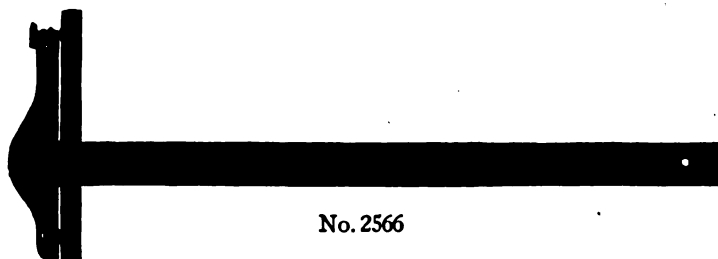


No. 2565

Mahogany, Ebony Lined Blade, with shifting double Head.

No. 2565.	Size.....	24"	30"	36"	42"	48"	54"	60"
	Each.....	\$1 75	2 00	2 25	2 50	2 80	3 25	3 90

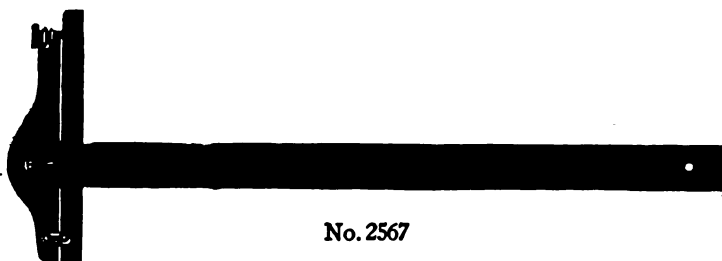
WOODEN T-SQUARES (Continued)



No. 2566

Mahogany, Ebony Lined Blade and Head, with patented nickel-plated micrometer adjustment.

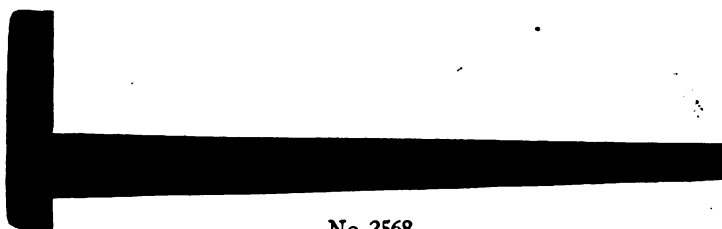
No. 2566.	Size.....	24"	30"	36"	42"	48"	54"	60"
	Each.....	\$1 65	1 90	2 15	2 40	2 65	3 15	3 65



No. 2567

Mahogany, Ebony Lined Blade and movable Head, with improved nickel-plated patented clamping swivel and nickel-plated patented micrometer adjustment.

No. 2567.	Size.....	24"	30"	36"	42"	48"	54"	60"
	Each.....	\$2 50	2 65	2 90	3 15	3 40	3 90	4 25

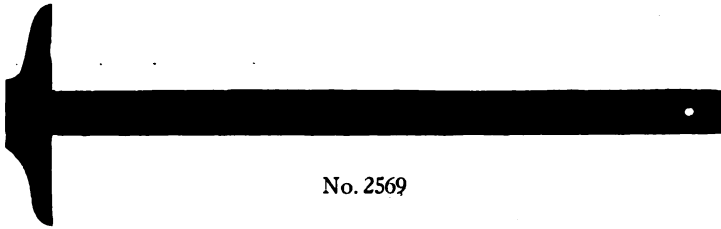


No. 2568

Mahogany, Ebony Lined and fixed Head, beveled edge Blade, tapered to prevent spring or bending.

No. 2568.	Size.....	30"	36"	42"	48"	54"
	Each.....	\$1 20	1 40	1 60	1 85	2 25

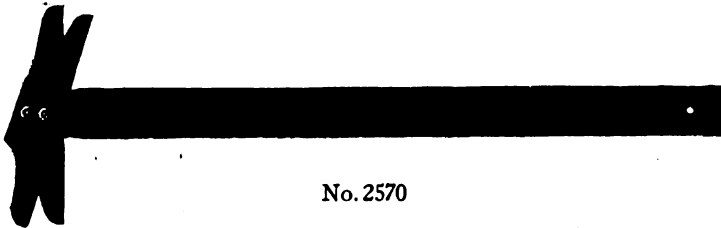
WOODEN T-SQUARES (Continued)



No. 2569

Transparent Amber Lined, Maple Blade, Black Walnut fixed Head.

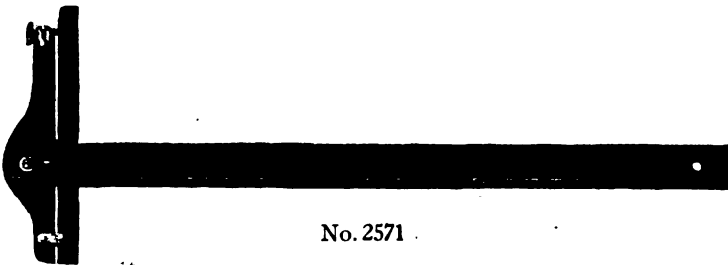
No. 2569.	Size.....	18"	24"	30"	36"	42"	48"	54"	60"
	Each.....	\$1 10	1 50	1 85	2 15	2 50	3 00	4 00	5 00



No. 2570

Transparent Amber Lined, Maple Blade, Black Walnut shifting double Head.

No. 2570.	Size.....	18"	24"	30"	36"	42"	48"	54"	60"
	Each.....	\$1 90	2 45	2 80	3 20	3 60	4 20	5 25	6 25

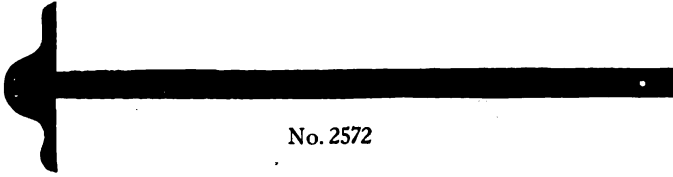


No. 2571

Transparent Amber Lined, Maple Blade, with improved nickel-plated clamping swivel and patented nickel-plated micrometer adjustment.

No. 2571.	Size.....	24"	30"	36"	42"	48"
	Each.....	\$3 15	3 50	3 90	4 35	5 00

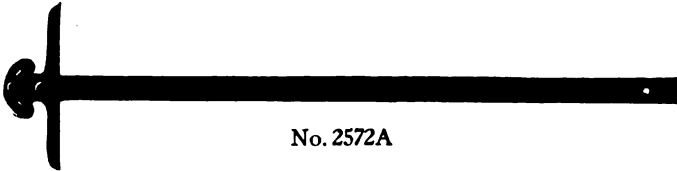
STEEL T-SQUARES



No. 2572

Steel Blade, nickel-plated, japanned Iron Head.

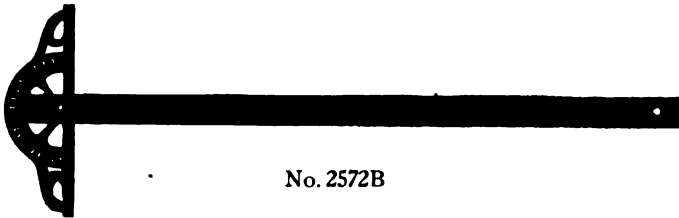
No. 2572.	Length.....	18"	24"	30"	36"	42"
	Width.....	1½"	1½"	1½"	1½"	1½"
	Thickness.....	⅜"	⅜"	⅜"	⅜"	⅜"
	Each.....	\$3 00	3 50	4 50	5 50	6 50



No. 2572A

Steel Blade, nickel-plated, shifting japanned Iron Head.

No. 2572A.	Length.....	18"	24"	30"	36"	42"
	Width.....	1½"	1½"	1½"	1½"	1½"
	Thickness.....	⅜"	⅜"	⅜"	⅜"	⅜"
	Each.....	\$4 25	5 00	5 70	6 70	7 70

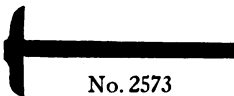


No. 2572B

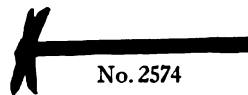
Protractor T-Square, Steel Blade, nickel-plated, shifting Head, with Protractor divided to half degrees, Vernier on end of blade reading to minutes.

No. 2572B.	Size.....	24"	30"	36"	42"
	Width.....	1½"	1½"	1½"	1½"
	Thickness.....	⅜"	⅜"	⅜"	⅜"
	Each.....	\$8 50	9.50	10 50	11 50

ENGRAVERS' T-SQUARES



No. 2573



No. 2574

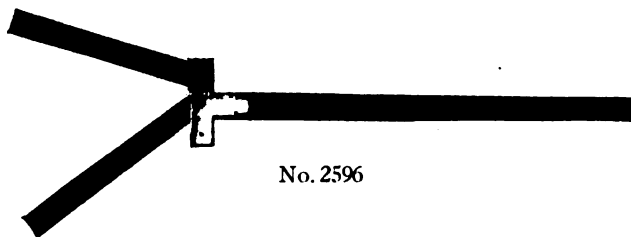
Engravers' T-Square, Steel Blade, fixed Head.

No. 2573.	Size.....	6"	8"	10"	12"
	Each.....	\$1 25	1 50	2 00	2 50

Engravers' T-Square, Steel Blade, shifting Head, with swivel.

No. 2574.	Size.....	6"	8"	10"	12"
	Each.....	\$1 50	1 75	2 25	2 75

PERSPECTIVE LINEAD



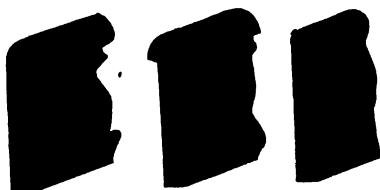
No. 2596

Perspective Linead, Mahogany, Ebony Lined, with two studs.

No. 2596.	Blade, 24"; arms, 11".....	Each, \$3 00
	" 30"; " 11".....	" 3 50
	" 36"; " 12".....	" 4 00

BEAM COMPASS BARS

Hardwood



Style 1

Style 2

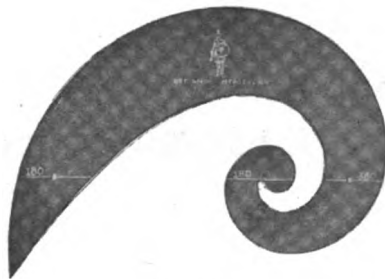
Style 3

No. 2599

Styles 1, 2, or 3.

No. 2599.	Size.....	24"	30"	36"	42"	48"	60"
	Each.....	\$ 25	30	35	40	50	65

LOGARITHMIC SPIRAL CURVE



No. 2600

No. 2600.	Black Amber Spiral Curve.....	Each, \$1 25
2600T.	In Transparent Amber.....	" 1 75

SPECIAL COMBINATION CURVE



No. 2601

No. 2601.	In Black Amber.....	Each, \$0 75
2601T.	In Transparent Amber.....	" 1 00

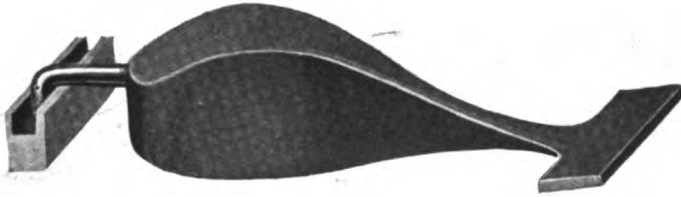
SET OF 10 COPENHAGEN SHIP CURVES FOR MECHANICAL ENGINEERS



No. 2603

No. 2602.	Wood. Per Set.....	\$3 20
2603.	Black Amber. Per Set.....	3 75
2603T.	Transparent Amber. Per set.....	4 80

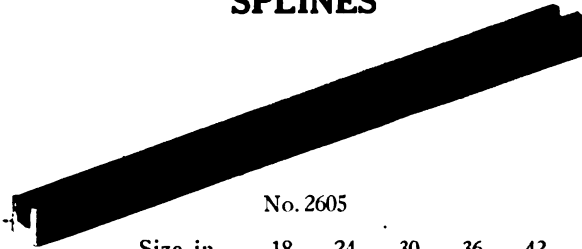
WEIGHTS FOR SPLINES



No. 2604

No. 2604. Weights for Splines, with finger..... Each, \$0 85

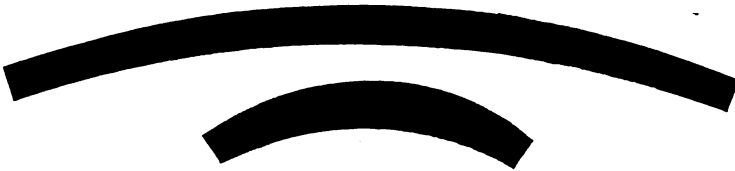
SPLINES



No. 2605

		Size, in.	18	24	30	36	42	48	54	60
No. 2605.	In Black Amber.....	\$0	20	25	35	40	45	50	..	..
2606.	In Wood		12	15	20	25	30	35	40	45
2607.	Amber		35	40	45	50	55	60	..	..

RAILROAD CURVES

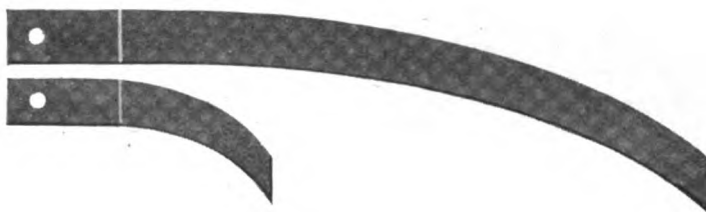


No. 2614

ALL CURVES FINISHED IN PLAIN WOODEN CASES

		1 Set of 10 Curves, from 12" to 120" radius, varying 12"	Per Set
No. 2613.	Arc, finished only on the convex side. In Wood.....		\$3 50
2614.	" " " " " " " " " Black Amber		6 50
2615.	" " " " " " " " " Amber		9 50
2616.	" " " " " " " " " Card Board.....		3 25
		1 Set of 17 Curves, from 12" to 60" radius, varying 3".	
2617.	Arc, finished only on the convex side. In Wood.....		6 00
2618.	" " " " " " " " " Black Amber		12 00
2619.	" " " " " " " " " Amber		15 00
2620.	" " " " " " " " " Card Board.....		5 50

RAILROAD CURVES—Continued



No. 2630

100 Foot Scale

No. 2630. Set of 41 Curves, **with Tangent**, made in Black Amber, Wood and Transparent Amber. Marked in degrees and inches.

0° .30' = 114.59"	3° .30' = 16.37"	6° .00' = 9.55"	8° .30' = 6.75"
1° .00' = 57.30"	3° .45' = 15.28"	6° .15' = 9.17"	8° .45' = 6.55"
1° .15' = 45.84"	4° .00' = 14.33"	6° .30' = 8.82"	9° .00' = 6.37"
1° .30' = 38.20"	4° 15' = 13.48"	6° .45' = 8.49"	9° .15' = 6.20"
1° .45' = 32.74"	4° .30' = 12.73"	7° .00' = 8.19"	9° .30' = 6.04"
2° .00' = 28.65"	4° .45' = 12.07"	7° .15' = 7.91"	9° .45' = 5.88"
2° .15' = 25.47"	5° .00' = 11.46"	7° .30' = 7.64"	10° .00' = 5.74"
2° .30' = 22.92"	5° .15' = 10.92"	7° .45' = 7.40"	10° .30' = 5.48"
2° .45' = 20.84"	5° .30' = 10.42"	8° .00' = 7.17"	11° .00' = 5.22"
3° .00' = 19.10"	5° .45' = 9.97"	8° .15' = 6.95"	11° .30' = 4.99"
3° .15' = 17.63"			

No. 2640.	In Wooden Box, Black Amber.....	Per Set, \$30 00
2641.	" " " Amber.....	" 40 00
2642.	" " " Wood.....	" 25 00

Single Railroad Curves, with Tangent .	In Wood.....	Each, 75
" " " " "	" Black Amber.....	" 1 00
" " " " "	" Amber	" 1 20

Scale 400 Feet to the Inch.

1 Set of 20 Curves from 30 minutes to 10 degrees by every 30 minutes.

No. 2645.	Arc finished only on convex side.	In Wood.....	Per Set, \$9 50
2646.	" " " " " "	" Black Amber....	" 14 00
2647.	" " " " " "	" Amber	" 18 30
2648.	" " " " " "	" Card Board.....	" 6 50

RAILROAD CURVES MADE TO ORDER

RAILROAD CURVES—Continued

1 Set of 43 Curves, from 3½" to 200" Radius.

Varying ½" from	3½" to	10"	Varying 6" from	42" to	90"
" 2" "	10 " "	24"	" 10" "	90" "	140"
" 3" "	24 " "	42"	" 20" "	140" "	200"

No. 2656.	Arc, finished only on the convex side.	In Wood.....	Per Set, \$19 00
2657.	" " " " " "	" " Black Amber "	30 00
2658.	" " " " " "	" " Amber	38 70
2659.	" " " " " "	" " Card Board. "	14 00

1 Set of 20 Curves, from 12" to 120" Radius, Varying 6".

No. 2660.	In Wood	Per Set, \$9 00
2661.	" Black Amber	" 14 00
2662.	" Amber	" 18 00
2663.	" Card Board	" 6 50

SCALE OF DEGREES

Scale 40 Feet to the Inch

1 Set of 10 Curves, from 1° to 10° by every degree

No. 2668.	In Wood	Per Set, \$4 50
2669.	" Black Amber	" 7 00
2670.	" Amber	" 9 00
2671.	" Card Board	" 3 25

1 Set of 20 Curves, from 1° to 20° by every degree

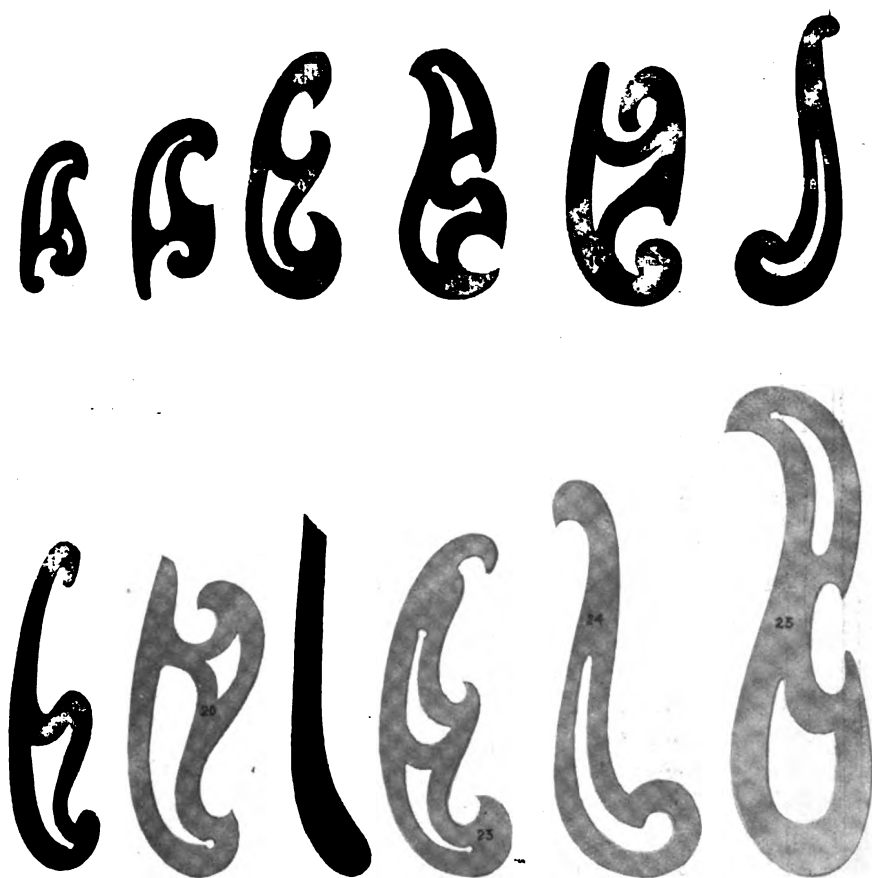
No. 2672.	In Wood	Per Set, \$9 00
2673.	" Black Amber	" 14 00
2674.	" Amber	" 18 00
2675.	" Card Board	" 6 50

Scale of 100 Feet to the Inch

1 Set of 12 Curves, from 1° to 12° by every degree

No. 2676.	In Wood	Per Set, \$5 40
2677.	" Black Amber	" 8 40
2678.	" Amber	" 10 80
2679.	" Card Board	" 3 00

IRREGULAR WOODEN CURVES

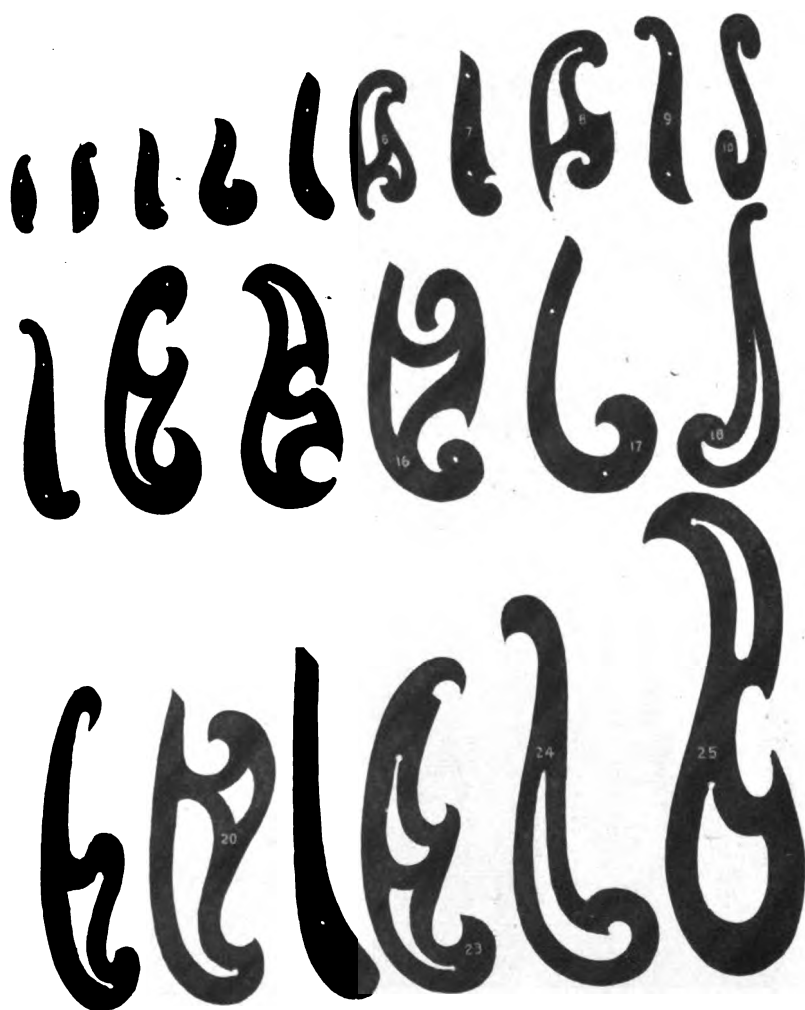


No. 2685

No. 2685. Pearwood Curves.

Nos.	6	8	13	15	16	18
Each	\$0 15	20	25	25	25	25
Nos.	19	20	21	23	24	25
Each	\$0 30	30	25	35	35	40

BLACK AMBER CURVES

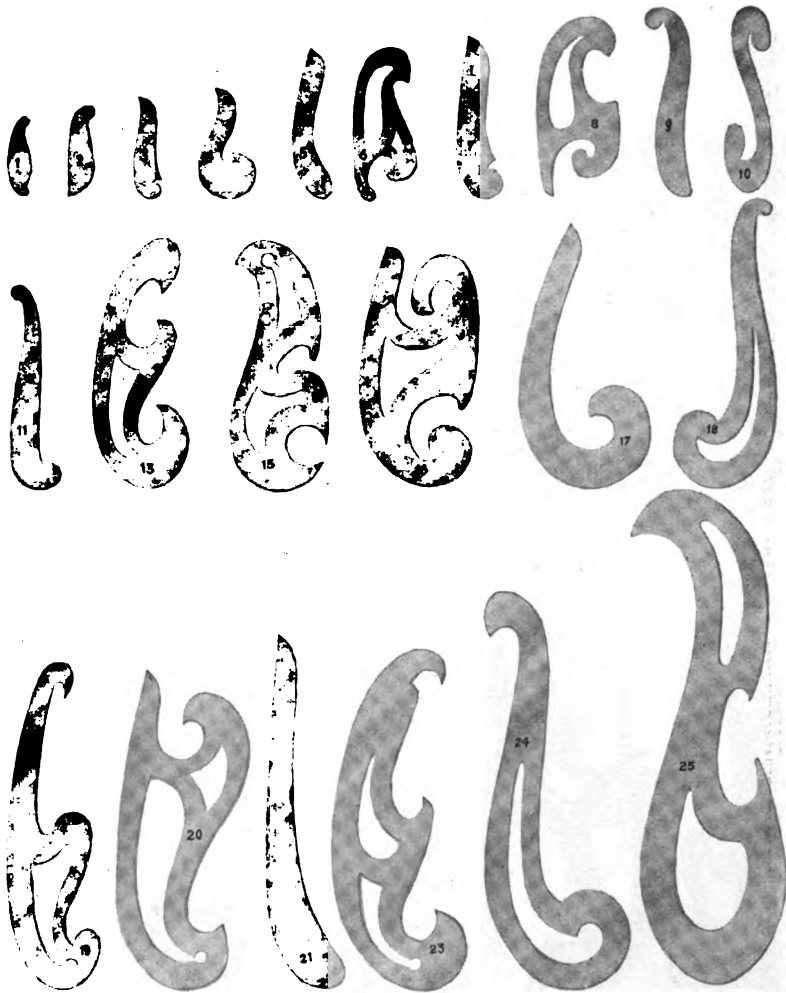


No. 2691

No. 2691. Black Amber Curves.

Nos.	1	2	3	4	5	6	7	8	9	10	11
Each \$0	30	30	30	30	30	30	30	35	30	30	30
Nos.	13	15	16	17	18	19	20	21	23	24	25
Each \$0	40	40	45	45	40	50	55	40	65	65	1 00

TRANSPARENT AMBER CURVES

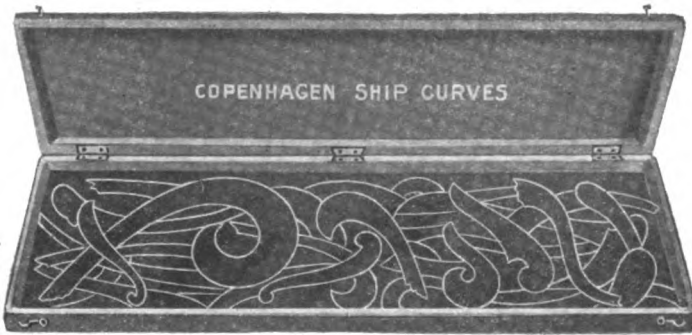


No. 2695

No. 2695. Transparent Amber Curves.

Nos.	1	2	3	4	5	6	7	8	9	10	11
Each \$	0 35	35	35	40	40	45	45	50	50	50	50
Nos.	13	15	16	17	18	19	20	21	23	24	25
Each \$	0 60	60	60	60	60	75	90	60	90	90	1 50

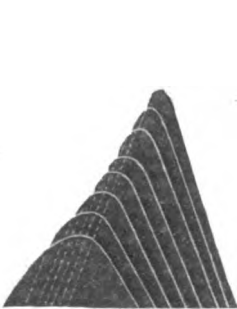
COPENHAGEN SHIP CURVES



No. 2701

		Per Set
No. 2701.	45 in Set, of Black Amber , from No. 1 to No. 45, complete..	\$16 50
2702.	45 in Set, of Hardwood , from No. 1 to No. 45, complete.....	16 50
2703.	45 in set, of Transparent Amber , No. 1 to No. 45, complete	31 50

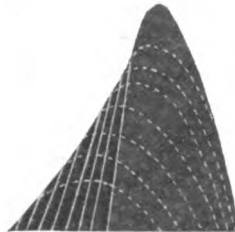
ELLIPSES, HYPERBOLAS, AND PARABOLAS



No. 2704



No. 2705



No. 2707

						Per Set
No. 2704.	Hard Rubber Hyperbolas,	8 in set, from 2 to 5½"	.....			\$2 25
2705.	" " Ellipses,	10 " " " 1½ " 6 "	.....			2 50
2706.	" " " "	6 " " " 2 " 4½"	.....			1 50
2707.	" " Parabolas,	8 " " " 1¼ " 5½"	.....			2 25
2708.	" " " "	8 " " " 3¼ " 14¼"	.....			5 00

COPENHAGEN SHIP CURVES—Continued



No. 2709

No. 2709.	Copenhagen Ship Curves.	Wood	Black Amber	Transparent
	Single Curves	\$0 70 Each	\$0 95 Each	\$1 15 Each
	1 to 9	50 "	50 "	60 "
	10 " 16	40 "	35 "	45 "
	17 " 27	30 "	25 "	35 "
	28 " 45			

ADJUSTABLE CURVE RULES



No. 2710

No. 2710. Adjustable Curve Ruler, 14½" long.....Each, \$2 25



No. 2712

No. 2712. Adjustable Curve Ruler, 30" long.....Each, \$3 30



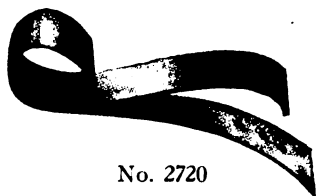
No. 2714



No. 2714.	Adjustable Curve Ruler, 7" long, double edge.....	Each, \$0 42
2716.	" " " 15" " " " "	" 87
2718.	" " " 31" " " " "	" 1 70

LAWRENCE FLEXIBLE RULER

PATENTED



703,208

No. 2720

See That Bend? It Will Not Break.

This ruler is composed of a heavy piece of highly nickel-plated steel, on which there is a rubber strip vulcanized to the under side re-enforced with eyelets. We claim that the ruler will not blot, as the ink will not adhere to the steel, and it is also protected by gutters in the rubber part of the ruler. This ruler can be bent double without breaking. It is a rather heavy ruler and can be used as a paper weight. When being used for ruling, it needs only a very slight pressure to prevent it from slipping, this being a bad feature in most all other flexible steel rulers. These rulers are furnished plain without graduations.

No. 2720.	12".....	Each, \$0 50
	15".....	" 70
	18".....	" 80
	24".....	" 1 00

COPENHAGEN SHIP CURVES—Continued



No. 2709

No. 2709. Copenhagen Ship Curves.				Wood	Black Amber	Transparent
Single Curves	1 to 9			\$0 70 Each	\$0 95 Each	\$1 15 Each
"	10 " 16			50 "	50 "	60 "
"	17 " 27			40 "	35 "	45 "
"	28 " 45			30 "	25 "	35 "

ADJUSTABLE CURVE RULES



No. 2710

No. 2710. Adjustable Curve Ruler, 14½" long.....Each, \$2 25



No. 2712

No. 2712. Adjustable Curve Ruler, 30" long.....Each, \$3.50



No. 2714



No. 2714.	Adjustable Curve Ruler, 7" long, double edge.....	Each,	\$0 42
2716.	" " " 15" " " "	"	87
2718.	" " " 31" " " "	"	1 70

LAWRENCE FLEXIBLE RULER



No. 2720

703,208

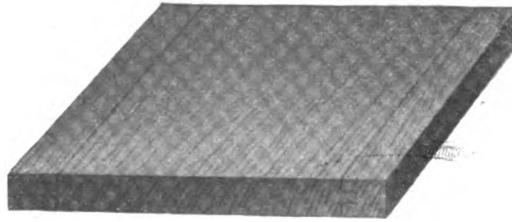
See That Bend? It Will Not Break.

This ruler is composed of a heavy piece of highly nickel-plated steel, on which there is a rubber strip vulcanized to the under side re-enforced with eyelets. We claim that the ruler will not blot, as the ink will not adhere to the steel, and it is also protected by gutters in the rubber part of the ruler. This ruler can be bent double without breaking. It is a rather heavy ruler and can be used as a paper weight. When being used for ruling, it needs only a very slight pressure to prevent it from slipping, this being a bad feature in most all other flexible steel rulers. These rulers are furnished plain without graduations.

No. 2720.	12"	.....	Each, \$0	50
	15"	.....	"	70
	18"	.....	"	80
	24"	.....	"	1 00

DRAWING BOARDS

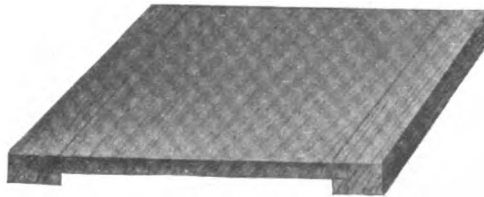
Made of Selected and Thoroughly Seasoned White Pine



No. 2732

No. 2732. Drawing Board with end battens, two drawing surfaces.

Size..	12 × 17	16 × 21	18 × 24	20 × 26	23 × 31	31 × 42"
Each.	\$0 65	95	1 10	1 25	1 75	3 50



No. 2736

No. 2736. Drawing Board with end battens.

Size..	12 × 17	16 × 21	18 × 24	20 × 26	23 × 31	31 × 42"
Each.	\$0 65	95	1 10	1 25	1 75	3 50



No. 2740

No. 2740. Drawing Board with Hardwood ledges, screws running in oval washers.

Size..	16 × 21	18 × 24	20 × 26	23 × 31	31 × 42	36 × 55"
Each.	\$1 50	1 95	2 20	2 80	4 50	7 50

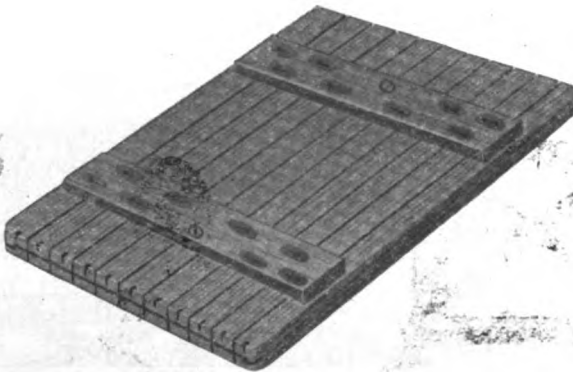
DRAWING BOARDS—Continued



No. 2742

No. 2742. Drawing Boards made of $\frac{3}{4}$ " Pine Wood, with $\frac{3}{4}$ " Hardwood Ledges Screwed to the back, running in Oval Metal Washers; the end of the Board is secured with Hardwood Strips, cut in.

Size..	18×24	19×25	20×26	22×28	23×31	31×42	33×55	36×55"
Each.	\$2 00	2 25	2 50	2 80	3 50	5 00	8 25	8 75



No. 2744

No. 2744. Drawing Board, **extra fine quality**, similar in construction to No. 2742.

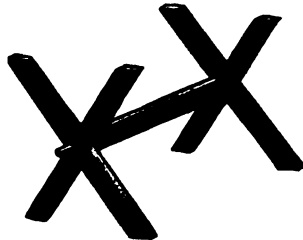
Size..	18×24	19×25	20×26	22×28	23×31	31×42	33×55	36×55"
Each.	\$2 15	2 50	3 00	3 50	3 75	6 25	9 25	10 00

HORSES FOR DRAWING BOARDS



No. 2752								Per Pair
No. 2750.	White	Wood	Horses,	30"	long,	37"	high, without slanting top..	\$3 00
2751.	"	"	"	30"	"	37"	" with " " ..	3 50
2752.	"	"	"	30"	"	37"	" " adjustable " ..	7 00

HARDWOOD TRESTLES



No. 2753. Ash Wood Trestles, Shellac finish, 37" long, 38" high...Each, \$5 60



No. 2755



No. 2757

No. 2755.	Folding Ash Wood Trestle, Shellac Finish, 37" high, 33" long	Each \$12 50
2756.	Board, 31 × 42"	with Drawing 16 75
2757.	Folding Ash Wood Trestle, Shellac Finish, with Drawing	
	Board, 33 × 55"	18 50

DRAWING STANDS AND TABLES

THE NOVEL ADJUSTABLE DRAWING STAND



No. 2760

The Adjustable Drawing Stand can be raised, lowered or set at an inclination instantly by loosening the nut of the central rod, which moves in slots of the legs, as readily seen from the illustration.

The drawing-board can be detached and the trestle folded up, occupying little more space than an ordinary drawing-board, a great advantage if the table is not used constantly, as it can be put out of the way or set up in a few minutes.

Trestles are made of Ash Wood, fine Shellac Finish, drawing-boards are made of clear and well seasoned pine.

No. 2760.	Novel Drawing Stand, with Drawing Board,	23 × 31"...	Each,	\$7 50
2761.	" " " " " "	31 × 42"...	"	10 00
2763.	" " " " " "	36 × 48"...	"	13 75
2764.	" " " " " "	42 × 60"...	"	18 00

For Defiance Parallel Straight Edge, see page 282.

DEMCO ADJUSTABLE DRAWING TABLE



No. 2770

The Demco Adjustable Drawing Tables are simply, but very substantially built. The stand is constructed of oak and the Drawing Board of thoroughly seasoned White Pine. This table can be very readily raised or lowered, and set at any desired angle for working in either a sitting or standing position, and can be folded when not in use.

No. 2770.	Demco Drawing Table, Board 23×31"	.....	Each,	\$8 00
2770B.	" " " " 31×42"	.....	"	10 00
2770C.	" " " " 33×55"	.....	"	17 50
2770D.	" " " " 36×60"	.....	"	20 00
2770E.	" " " " 48×72"	.....	"	30 00

For Defiance Parallel Straight Edge, see page 282.

FORSYTH'S PATENTED ADJUSTABLE DRAWING TABLE



No. 2775

Forsyth's Patented Adjustable Drawing Table, with Hardwood Trestles,
oil finish, Drawing Board of thoroughly seasoned White Pine.

No. 2775A.	With Board, 30 × 38"	.....	Each, \$15 65
2775B.	" " 32 × 42"	.....	" 16 25
2775C.	" " 36 × 50"	.....	" 18 25
2775D.	" " 36 × 54"	.....	" 19 25

For Defiance Parallel Straight Edge, see page 282.

FOLDING HARDWOOD TRESTLE

WITH BOARD



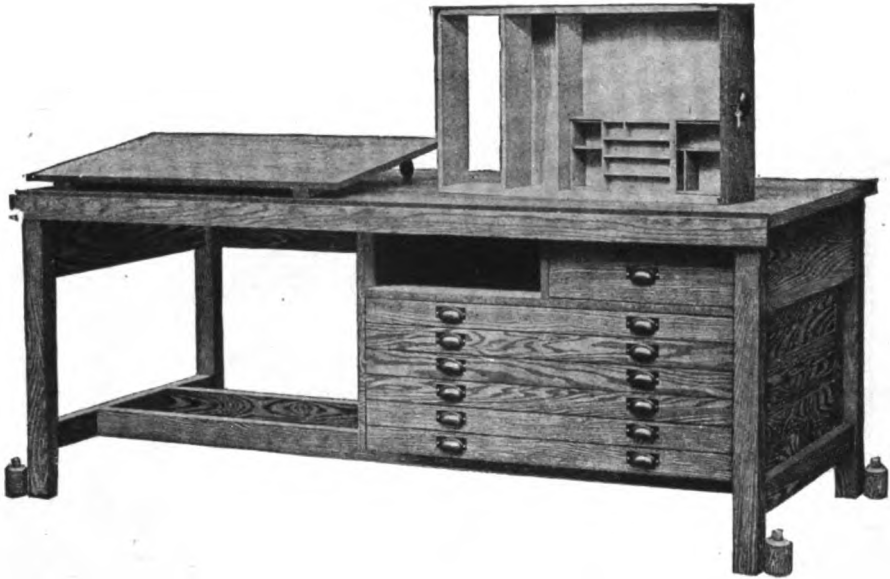
No. 2776

Folding Hardwood Trestle, Shellac Finish, with Drawing Board of thoroughly seasoned White Pine.

No. 2776A.	With Board, 23 × 31"	.....	Each, \$12 50
2776B.	" " 31 × 42"	.....	" 13 75
2776C.	" " 33 × 55"	.....	" 20 00
2776D.	" " 36 × 60"	.....	" 27 50
2776E.	" " 48 × 72"	.....	" 37 50

For Defiance Parallel Straight Edge, see page 282.

DRAWING TABLES



No. 2780

No. 2780. Engineer's Special Drawing and Reference Table and Filing Case Combined.....Each, \$48 00

Top, soft pine, $39 \times 84 \times 1\frac{1}{8}$ ". Table, 34" high.

Two small drawers, $21 \times 24 \times 4$ " inside, in two compartments, 18×21 " and 6×21 ".

Six large drawers, $32 \times 44 \times 2$ " inside. These drawers have a 6" lid at top and back of drawer to prevent drawings from slipping out.

Set of four raising blocks, 1", 2" or 3" high, to adjust the height of table. The dowel of the raising block fits into a dowel hole in the bottom of the leg.

Material, oak, except top. Finish, three-coat, dull, rubbed smooth. Antique, golden, natural, Flemish or weathered oak. Tables finished in antique oak, if not specified otherwise.

Extras

Loose inclined board, soft pine, as shown on top of table in cut, 32×44Each, \$3 75

Sliding tool tray and frame....." 1 50

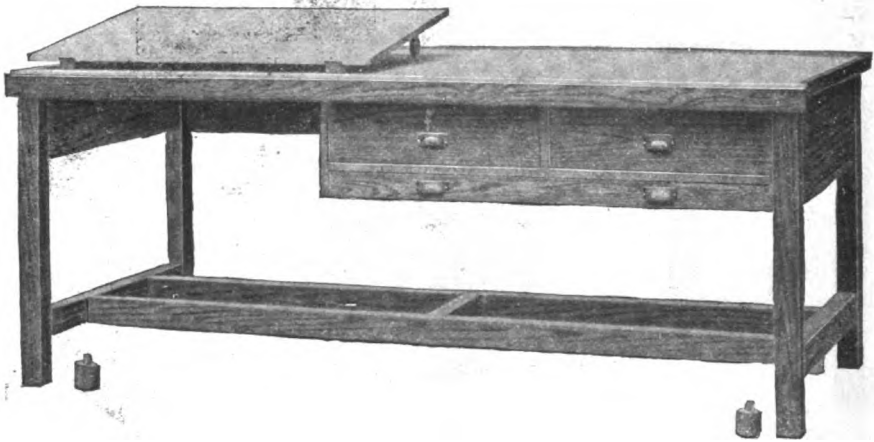
Lock, two keys....." 50

Lock master keyed, two keys each, one master key with eight or more locks....." 1 00

With adjustable top, as shown on page 191....." 3 00

For Defiance Parallel Straight Edge, see page 282.

DRAWING TABLES (Continued)



No. 2781

No. 2781. Draftsman's Special Drawing Tables.....Each, \$35 00

Top, soft pine, $39 \times 84 \times 1\frac{1}{2}$ ". Table, 34" high.

Two small drawers, $21 \times 24 \times 4$ " inside, in two compartments, 18×21 " and 16×21 ".

One large drawer, $32 \times 44 \times 2$ " inside.

Set of four raising blocks, 1", 2" or 3" high, to adjust the height of table. The dowel of the raising block fits into a dowel hole in the bottom of the leg.

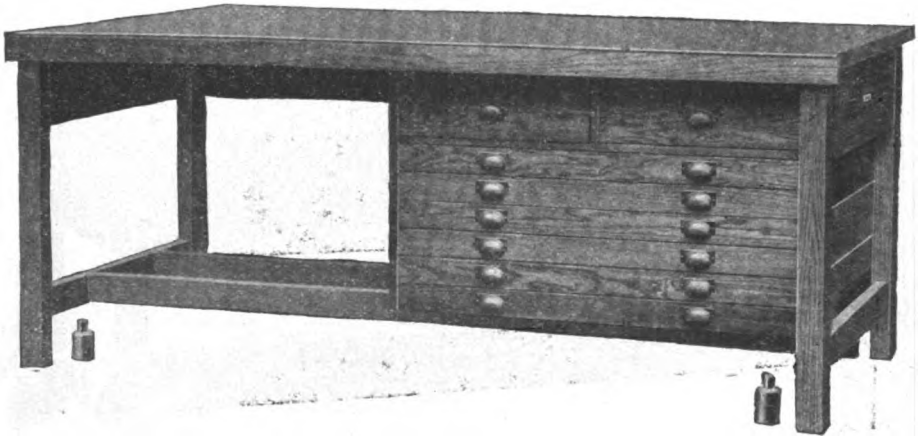
Material, oak, except top. Finish, three-coat, dull, rubbed smooth.

Extras

Same as noted for No. 2780.

For Defiance Parallel Straight Edge, see page 202.

DRAWING TABLES (Continued)



No. 2782

No. 2782. The Engineer's Drawing and Reference Table and Filing Case Combined.....Each, \$45 00.

Top, soft pine, $39 \times 84 \times 1\frac{1}{2}$ ". Table, 34" high.

Two small drawers, $18 \times 24 \times 4$ " inside, in two compartments, 18×18 " and 6×18 ".

Size large drawers, $26 \times 38 \times 2$ " inside. These drawers have a 6" lid at top and back of drawer to prevent drawing from slipping out.

Set of four raising blocks, 1", 2, or 3" high, to adjust the height of table. The dowel of the raising block fits into a dowel hole in the bottom of the leg.

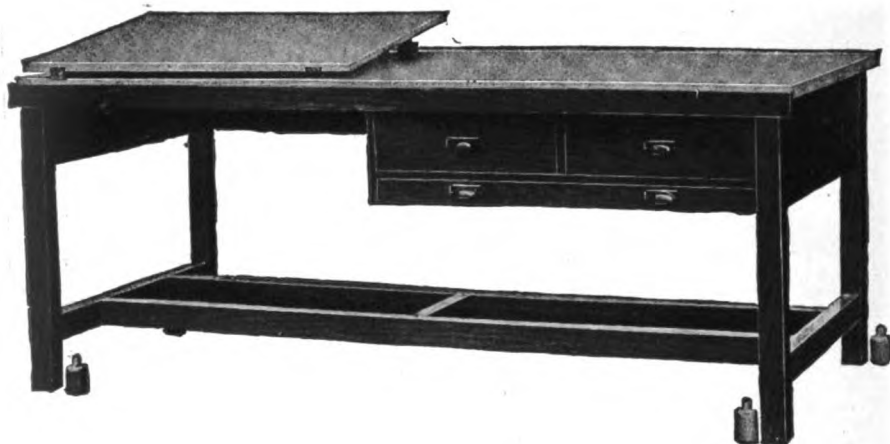
Material, oak, except top. Finish, three-coat, dull, rubbed smooth. Antique, golden, natural, Flemish or weathered oak. Tables finished in antique oak, if not specified otherwise.

Extras

Same as noted for No. 2780.

For Defiance Parallel Straight Edge, see page 202.

DRAWING TABLES (Continued)



No. 2783

No. 2783. The Draftsman Drawing Table.....Each, \$32 00

Top, soft pine, $39 \times 84 \times 1\frac{1}{2}$ ". Table, 34" high. Two small drawers, $18 \times 24 \times 4$ " inside, in two compartments, 18×18 " and 6×18 ".

One large drawer, $26 \times 38 \times 2$ " inside.

Set of four raising blocks, 1", 2" or 3" high, to adjust the height of table.

The dowel of the raising block fits into a dowel hole in the bottom of the leg.
Material, oak, except top. Finish, three-coat, dull, rubbed smooth.

Extras

Same as noted for No. 2780.

For Defiance Parallel Straight Edge, see page 202.

DRAWING TABLES (Continued)



No. 2784

No. 2784. The Designer's Drawing Cabinet.....Each, \$42 00
 With adjustable top..... " 45 00

Same drawer space as table No. 2782.

Top, soft pine, $34 \times 72 \times 1\frac{1}{2}$ ". Table, 34" high.

Two small drawers, $18 \times 24 \times 4$ " inside, in two compartments, 18×18 and 6×18 ", as shown with No. 2780.

Six large drawers, $26 \times 38 \times 2$ " inside. These drawers have a 6" lid at top and back of drawer to prevent drawings from slipping out.

Set of four raising blocks, 1", 2 or 3" high, to adjust the height of table. The dowel of the raising block fits into a dowel hole in the bottom of the leg.

Material, oak, except top. Finish, three-coat, dull, rubbed smooth. Antique, if not specified otherwise.

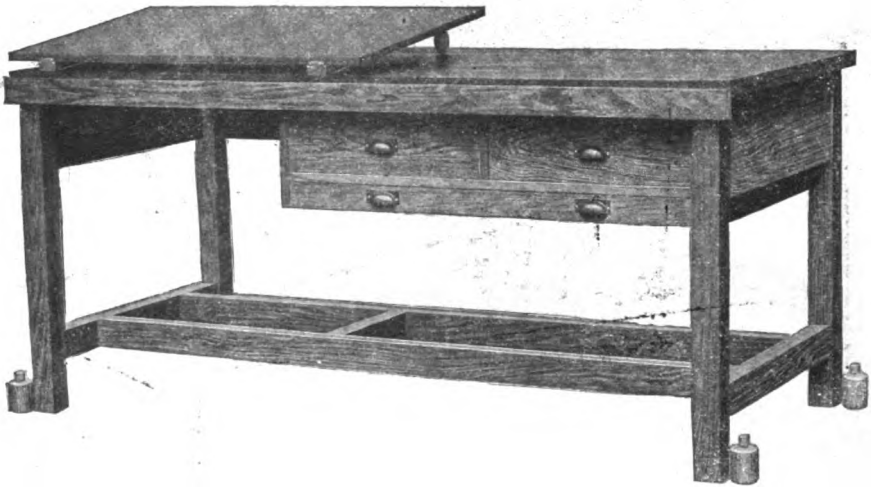
Stationary top will be furnished unless an adjustable top is ordered as an extra.

Extras

Same as noted for No. 2780.

For Defiance Parallel Straight Edge, see page 282.

DRAWING TABLES (Continued)



No. 2785

No. 2785. The Detailer Drawing Table.....Each, \$30 00

Top, soft pine, $34 \times 72 \times 1\frac{1}{2}$ ". Table, 34" high.

Two small drawers, $18 \times 24 \times 4$ " inside, in two compartments, 18×18 " and 6×18 ".

One large drawer, $26 \times 38 \times 2$ " inside.

Set of four raising blocks, 1", 2" or 3" high, to adjust the height of table. The dowel of the raising block fits into a dowel hole in the bottom of the leg.

Material, oak, except top. Finish, three-coat, dull, rubbed smooth.

Extras

Same as noted for No. 2780.

For Defiance Parallel Straight Edge, see page 202.

DRAWING TABLES (Continued)



No. 2786

No. 2786. The Contractor Drawing Table.....Each, \$20 00

Top, soft pine, $33 \times 60 \times 1\frac{1}{8}$ ". Table, 34" high.

One small drawer, $13 \times 26 \times 4$ " inside, in two compartments, 13×18 " and $13 \times 7\frac{1}{2}$ ".

One large drawer, $26 \times 38 \times 2\frac{1}{4}$ " inside.

Set of four raising blocks, 1", 2" or 3" high, to adjust the height of table. The dowel of the raising block fits into a dowel hole in the bottom of the leg.

Material, oak, except top. Finish, three-coat, dull, rubbed smooth. Antique, if not specified otherwise.

Extras

Same as noted for No. 2780.

For Defiance Parallel Straight Edge, see page 282.

DRAWING TABLES (Continued)



No. 2787

No. 2787. The Architect Drawing Table.....Each, \$30 00

Top, soft pine, $33 \times 60 \times 1\frac{1}{8}$ ". Table, 34" high.

One small drawer, $13 \times 26 \times 4$ " inside, in two compartments, 13×18 " and $13 \times 7\frac{1}{2}$ ".

Four small drawers, $13\frac{1}{2} \times 24\frac{1}{2} \times 3\frac{1}{2}$ " inside.

One large drawer, $26 \times 38 \times 2\frac{1}{4}$ " inside.

Set of four raising blocks, 1", 2" or 3" high.

Material, oak, except top. Finish, three-coat, dull, rubbed smooth.

Extras

Same as noted for No. 2780.

For Defiance Parallel Straight Edge, see page 282.

DRAWING TABLES (Continued)



No. 2788

No. 2788A.	The Unique Adjustable Drawing Table,	37 × 60.....	Each, \$37 00
2788B.	" " " " "	37 × 72.....	" 40 00
2788C.	" " " " "	43 × 72.....	" 43 00
2788D.	" " " " "	43 × 84.....	" 46 00
2788E.	" " " " "	48 × 96.....	" 52 00

Top, soft pine, 37 × 60 × 1½" to 48 × 96 × 1½", as ordered.

Height, adjustable from 32" to 48".

Base, best gray cast iron, finished with several coats of black enamel.

Adjustments:—The top has a positive vertical adjustment with racks and pinions operated through spring ratchets from the front of the table by the foot lever at the right. The top is raised about 1½" by each downward thrust of the foot lever and locks automatically at any height, while the lever springs back as soon as the foot is removed. By raising the hand lever the ratchets are released and the top moves down. By pressing down on the same lever, the top is rigidly clamped and securely locked at the desired height. All working parts are enclosed in a metal case.

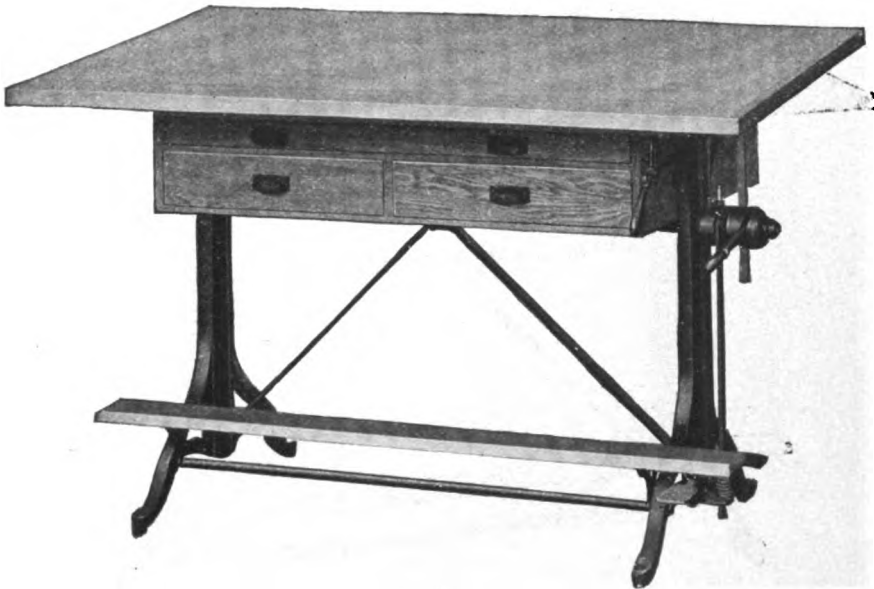
The top swings from a horizontal to a vertical position, independent of the height, and is firmly clamped at any angle by the small handle under the front edge. This handle, always within easy reach, controls both clamps at the back of the table, so that the inclination as well as the height of the top can be changed easily and quickly from the front. Steel springs counterbalance the weight of the top when clamps are released.

Extras

Wooden foot rest, as shown in cut above, extra \$1 00.

For Defiance Parallel Straight Edge, see page 282.

DRAWING TABLES (Continued)



No. 2790

No. 2790. The Acme Adjustable Drawing Table, with drawer facilities.

Top, soft pine, $37 \times 60 \times 1\frac{1}{8}$ " to $48 \times 96 \times 1\frac{1}{8}$ ", as ordered.

Height, adjustable from 34" to 48".

Base, best gray cast iron, finished with several coats of black enamel baked on at a high temperature.

Adjustments, same as for Table No. 2788.

Cabinet contains two drawers, $18 \times 24 \times 4$ " inside and one drawer, $26 \times 38 \times 1\frac{1}{2}$ " inside; closed on top.

The top of the cabinet on Table No. 2790 forms a reference table or shelf, which is very convenient when the tables are placed one behind the other in the drafting room.

	Size	Each
No. 2790A.....	37×60	\$55 00
2790B.....	37×72	58 00
2790C.....	43×72	61 00
2790D.....	43×84	64 00
2790E.....	48×96	70 00

Extras

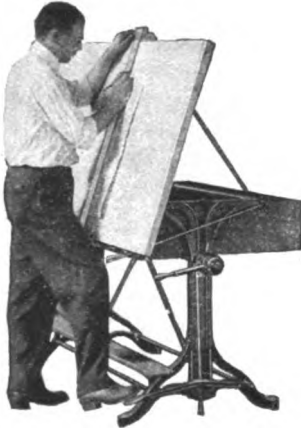
Wooden foot rest.....	Each, \$1 00
Lock, with two keys.....	" 50
Master lock.....	" 1 00



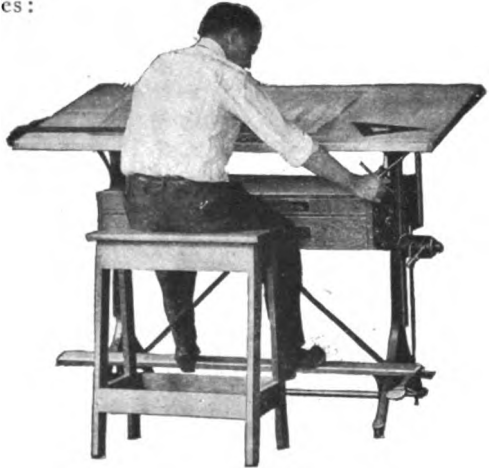
For Defiance Parallel Straight Edge, see page 262.

DRAWING TABLES (Continued)

The following illustrations clearly indicate the great usefulness of the "Acme" Adjustable Drawing Tables:



You need not bend down to reach the lower points; the foot lever will bring them up to you.



It is not necessary to move from your drawing position to change the angle of inclination. This small handle controls the entire operation.



A place for everything and everything in its place is the correct system and true economy.



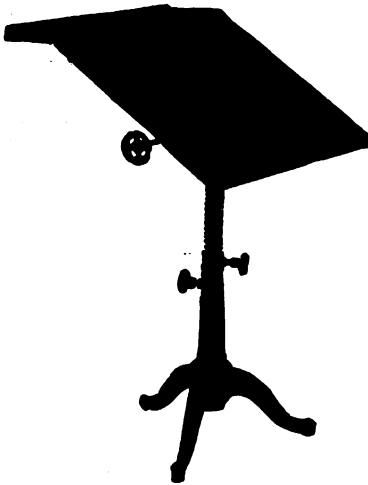
To lower the top raise the hand lever; to rigidly clamp it in position push the lever down. It takes only a fraction of a second.

Notice that all adjustments are made with ease from the front of the table. The levers are placed in the most convenient positions, and are so simple and easy to operate that you do not hesitate to use them whenever the top can be changed to advantage.

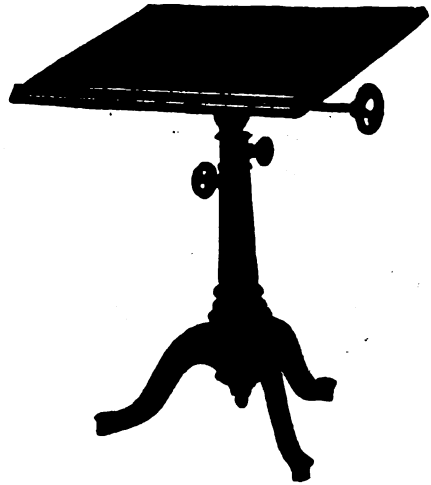
Keep your top in the most desirable position and work becomes a pleasure.

For Defiance Parallel Straight Edge, see page 202.

STAND AND DRAWING TABLES



No. 2792



No. 2793

- | | | | |
|-----------|---|-------|--------|
| No. 2792. | Adjustable Drawing Table. Top, antique oak, $20 \times 24\frac{1}{2}$ " ; height, 29" to 40" ; base, cast iron finished in black enamel ; without horizontal shelf..... | Each, | \$9 00 |
| 2793. | Adjustable Drawing Table. Top, antique oak, $23 \times 26\frac{1}{2}$ " ; height, 30" to 41" ; base, gray cast iron finished in black enamel, extra heavy ; without horizontal shelf..... | Each, | 10 50 |



No. 2794

- | | | | |
|-----------------------|---|-------|--------|
| 2794. | Adjustable Drawing Table. Same as No. 2793, but with rack and pinion device ; without horizontal shelf..... | Each, | 13 50 |
| Extras | | | |
| Horizontal shelf..... | | Each, | \$1 50 |

For Defiance Parallel Straight Edge, see page 282.

DRAFTSMAN'S STOOLS



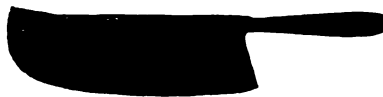
No. 2795A

No. 2795C

No. 2795E

- No. 2795A. Draftsman's Stool, golden elm, wood seat, height 34" ..Each \$1 50
 2795B. " " same as No. 2795A, but cane seat.. " 1 75
 2795C. " " golden elm, wood seat, height adjustable from 31" to 35".....Each, 4 50
 2795D. Draftsman's Stool, same as No. 2795C, but with cane seat.....Each, 4 50
 2795E. Draftsman's Stool, oak, wood seat, height adjustable from 31" to 35".....Each, 5 00
 2795F. Draftsman's Stool, like No. 2795E, but with cane seat. " 5 00

DUSTING BRUSHES



No. 2796

- No. 2796. Dusting Brush, invisible drawn wire, 8" brush with 6" handle.....Each, \$0 65
 2797. Dusting Brush, all bristle, set in pitch, 8" brush with 6" handle.....Each, 80

VERTICAL FILING CASE



No. 2802

No. 2802. Vertical Filing Case.....Each, \$38 00

The case occupies little floor space, being 43½" wide, 14" deep and 36" high, standing 3" from floor on sanitary legs.

The lid projects down over the top of the case, when closed, and the joint between is fitted with felt, rendering the case absolutely dustproof.

Each case contains twenty pockets, 38½" × 28" (larger sizes to order), made of heavy manila paper, the edges and seams of which are strongly bound with cloth. Each pocket hangs on wooden strips inserted in its edges. These strips project beyond the pocket and rest on hooks at the end of the case. The ends of each pocket are open, the front falling over the front of the case, giving easy access to the contents of the pocket. Each pocket will hold from twenty to forty drawings, depending upon the weight of the paper. The pockets can be numbered or lettered at the top for indexing purposes and six brass card holders are fastened on the inside of the lid.

Finish, three-coat, dull, rubbed. Antique oak.

For Defiance Parallel Straight Edge, see page 282.

THE STANDARD SECTIONAL FILING CASE



No. 2803

This cut shows a two-section standard case with 4" deep drawer in base. Each section has six drawers, the most drawer space of any sectional case made. Our holding-down wires or spring cover will double the capacity of a drawer.

The sectional filing case is designed with loose cap and base.

The base will be furnished with a 4" deep drawer, as shown in cut; plain base without drawer, or 8" sanitary base.

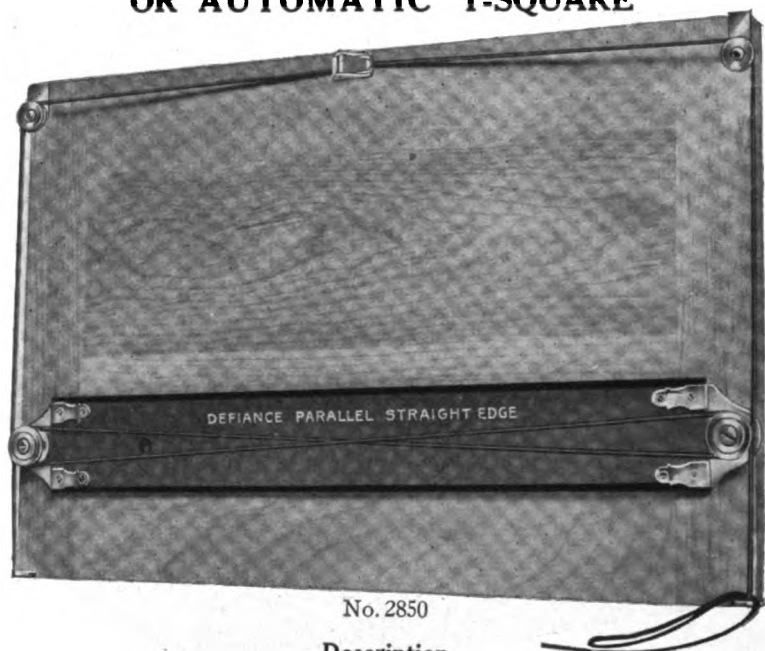
Drawers 3 5/16" deep should be used for filing blue prints or drawings that do not pack close together, and drawers 2" deep for tracings. The drawers have a 6" lid at the top and back to protect drawings. The sectional case enables one to build up the filing cases as requirements demand, and to fill in odd spaces.

The sections are put together without screws or fastenings, but are held in all directions, and are interchangeable.

Sizes and Dimensions				Each
Section of 6 drawers,	26 × 38 × 2"	inside,	29 × 41 × 17 1/4"	\$22 00
" " 4 "	26 × 38 × 3 5/16"	" "	29 × 41 × 17 1/4"	20 00
" " 2 "	18 × 26 × 4"	" "	29 × 41 × 5 1/4"	7 00
" " 1 "	26 × 38 × 4"	" "	29 × 41 × 5 1/4"	5 00
" " 6 "	32 × 44 × 2"	" "	35 × 47 × 17 1/4"	24 50
" " 4 "	32 × 44 × 3 5/16"	" "	35 × 47 × 17 1/4"	22 50
" " 2 "	21 × 32 × 4"	" "	35 × 47 × 5 1/4"	7 50
" " 1 "	32 × 44 × 4"	" "	35 × 47 × 5 1/4"	5 50
Base, plain,	26 × 38			2 75
" " 32 × 44				3 00
" sanitary, 8" high,	26 × 38			5 00
" " 8"	32 × 44			5 50
" with 4" deep drawer,	26 × 38			6 50
" " 4"	32 × 44			7 25
Loose Cap				6 00

For Defiance Parallel Straight Edge, see page 202.

THE DEFIANCE PARALLEL STRAIGHT EDGE OR AUTOMATIC T-SQUARE



Description

The Defiance Automatic T-Square consists of two single pulleys attached to the back corners of a board, two small brackets attached to the front corners, two ball-bearing double pulleys on the straightedge, a silk-covered tinsel cord and a small clamp.

The straightedge edge is held on the board as shown in cut, and can move forward and back with a parallel motion only. The straightedge can be set at various angles by pulling on the cord at the top of the board, the small clamp preserving the alignment after it has been adjusted.

Material and Finish

All pulleys and brackets are made of steel, nickel-plated and highly polished.

Advantages

(1) This attachment saves watching the head of the T-Square to make sure that it is always against the edge of the board, and thus enables the draftsman to work with greater rapidity and perfect ease.

(2) The straightedge is held and moved from each end, and the result is more accurate work.

(3) The straightedge does not project beyond the ends of the board and can be attached to a part of the surface only, if desired, leaving the other part clear for other work.

(4) The straightedge will not slide off when the board is inclined, and forms a ledge for pencils, instruments, etc.

(5) It can be attached to any board in a few minutes with a screw driver, and can be set aside for other work without removing the screws.

(6) The straight edge can be lifted from the board for changing drawings, and quickly adjusted to the desired angle on the new work.

(7) Ball-bearing, long wearing and easily operated.

The most prejudiced is convinced of the superiority of the Defiance Attachment after using it a week.

See page 203 for prices. When ordering, give both dimensions of the board and state style of straightedge desired.

THE DEFIANCE PARALLEL STRAIGHT EDGE ATTACHMENT OR AUTOMATIC T-SQUARE (Continued)

Easily attached to any horizontal, vertical or inclined board or table, or any part thereof. Can be easily removed or "knocked down" should occasion require.

Price depends on style of blade desired.

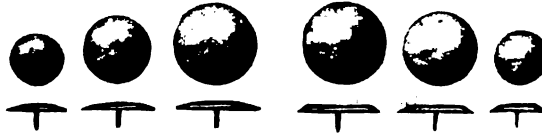
Fixtures without blade.....Per set, \$5 00

Prices Complete with Either

Length of Board Top in Inches	Mahogany Ebony Lined Blades	Mahogany or Maple Transparent Amber or Celluloid Lined
18"	\$ 5 35	\$ 5 70
24"	5 40	5 90
30"	5 55	6 15
32"	5 60	6 25
36"	5 70	6 40
42"	5 85	6 70
48"	6 10	7 00
54"	6 30	7 85
60"	6 50	8 75
72"	7 75	10 00
84"	9 50	11 75
96"	10 00	13 50
108"	10 25	15 25
120"	10 50	17 00

State length and width of Drawing Board when ordering.

“DEFIANCE” THUMB TACKS



No. 2870

No. 2870. Defiance Thumb Tacks are made by hand with great care. They have hardened steel points, proportioned according to thickness and length, so as not to bend. These are screwed and riveted into German Silver heads with fine thin edges, offering no obstruction to T-square or Triangle.

Packed one dozen on a card

No. 2872.	German Silver, Round Heads, $\frac{1}{8}$ " diameter.....	Per doz., \$0 50
2874.	" " " " $\frac{1}{4}$ " "	65
2876.	" " " " $\frac{3}{8}$ " "	80
2878.	" " Beveled Heads, $\frac{1}{8}$ " "	50
2880.	" " " " $\frac{1}{4}$ " "	65
2882.	" " " " $\frac{3}{8}$ " "	80

THUMB TACKS WITH RIVETED STEEL POINTS



No. 2884

Thumb Tacks No. 2884 to 2892 are constructed so that the points cannot come through the head.

Packed one dozen on a card

					Per gross	Per doz.
No. 2884.	German Silver, Round Heads, $\frac{1}{8}$ " diameter.....				\$2 00	\$0 20
2886.	" " " " $\frac{1}{4}$ " "				2 50	25
2888.	" " " " $\frac{3}{8}$ " "				3 50	35
2890.	Brass, " " $\frac{1}{8}$ " "				1 50	15
2891.	" " " " $\frac{1}{4}$ " "				2 00	20
2892.	" " " " $\frac{3}{8}$ " "				3 00	30

BRASS THUMB TACKS

In boxes of one gross only



No. 2900

No. 2900.	Brass, Round Heads,	$\frac{3}{8}$ " diameter.....	Per box of one gross,	\$1 00
2902.	"	" " " $\frac{1}{2}$ " "	" " " " "	1 30
2904.	"	" " " $\frac{5}{8}$ " "	" " " " "	1 60

STEEL STAMPED THUMB TACKS



No. 2906

No. 2906.	Round Heads,	$\frac{1}{8}$ " diameter.....	Per box of 100	\$0 40
2908.	"	" " " $\frac{3}{8}$ " "	" " " 100	50
2910.	"	" " " $\frac{1}{2}$ " "	" " " 100	65

HORN CENTERS



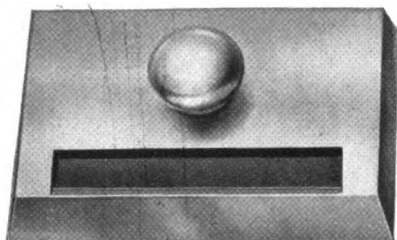
No. 2912



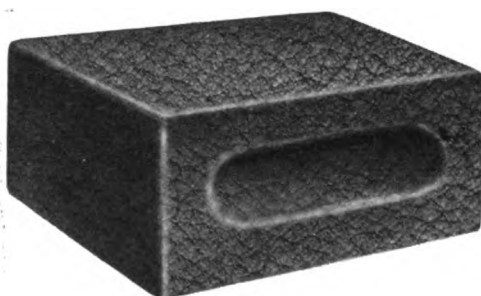
No. 2914

No. 2912.	Horn Center, plain,	$\frac{1}{2}$ " diameter.....	Each,	\$0 10
2914.	"	" with German Silver rim, $\frac{3}{4}$ " diameter.....	"	50

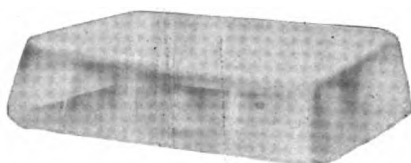
PAPER WEIGHTS



No. 2950



No. 2952



No. 2956



No. 2958

No. 2950.	Defiance Metal Paper Weight and Pencil Pointer, iron..	Each, \$0 30
2951.	" " " " " " " nickel "	50
2952.	Leather covered " " weight $1\frac{1}{2}$ lbs.....	" -50
2954.	" " " " " $2\frac{1}{2}$ "	" 75
2956.	Glass Paper Weights, oblong, $2\frac{1}{2} \times 4$ "	" 20
2958.	Iron " " oval, with knob, weight 1 lb.....	" 20

DESKAID CALENDAR STANDS



No. 2970

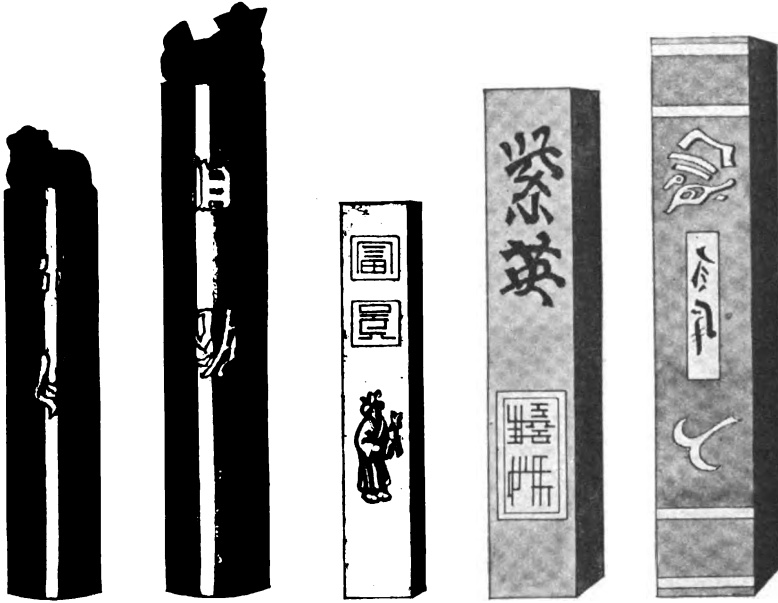
- | | | |
|-----------|---|--------------|
| No. 2970. | Deskaid Calendar Stands, with date pad, large size..... | Each, \$0 65 |
| 2972. | " " " " " " small " | " 40 |
| 2973. | Extra Pads for either size..... | " 25 |
| | Large Pad, 3 × 5". Small Pad, 2½ × 3¼". | |



No. 2974

- | | | |
|-----------|---|--------------|
| No. 2974. | Deskaid Calendar Stand, same as No. 2970, in leather finish | Each, \$1 25 |
| 2975. | Deskaid Calendar Stand, same as No. 2972, in leather finish | " 1 00 |

INDIA INKS



No. 3004

No. 3006

No. 3008

No. 3002

No. 3000

No. 3000.	Super Super, 12 to 1b.....	Each, \$0 65
3002.	" " 24 " "	" 35
3004.	" Lion Head, Round Gilt.....	" 10
3006.	" " " Oval Plain.....	" 15
3008.	Square, Plain	" 05

INDIA INKS—Continued



No. 3024



No. 3026



No. 3020

No. 3020.	Oblong, Black, Gilt Figures.....	Each, \$1 00
3022.	" Gilt, Double Dragon.....	" 2 50
3024.	" Plain Stork	" 3 00
3026.	" Double Golden Dragon.....	" 4 50
3028.	Red India Ink.....	" 25
3030.	Blue " "	" 25

"DEFIANCE" LIQUID DRAWING INKS

Absolutely Waterproof



No. 3050.

Defiance Liquid Waterproof Inks are manufactured by an entirely new process and will be found to meet all the requirements of a perfect Drawing Ink.

For uniformity, opacity and free flowing properties they are incomparable. Careful tests and comparisons have been made with Defiance Ink, and the product of other manufacturers, the result being that Defiance Liquid Waterproof Ink (black or colors), has been pronounced the finest Ink on the market.

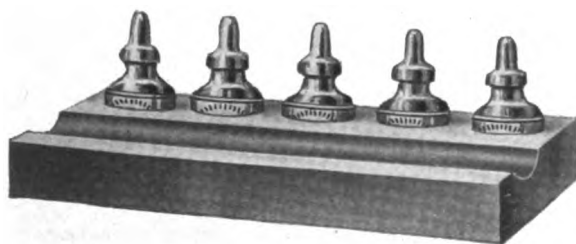
The colored Drawing Inks are all perfect and true colors with intense brilliancy.

They can be mixed freely to produce other tints and can be used for either lines or washes.

For sizes and prices, see next page.

“DEFIANCE” LIQUID DRAWING INKS—Continued

					$\frac{3}{4}$ oz.	4 oz.	$\frac{1}{2}$ Pt.	Pt.	Qt.
No. 3050.	Defiance Waterproof, Black	Ink,	\$0 25		\$1 00	\$2 00	\$3 75	\$7 00	
3052.	“	“	Brown	“	25	1 00	2 00	3 75	7 00
3054.	“	“	Blue	“	25	1 00	2 00	3 75	7 00
3056.	“	“	Carmin	“	25	1 00	2 00	3 75	7 00
3058.	“	“	Green	“	25	1 00	2 00	3 75	7 00
3060.	“	“	Orange	“	25	1 00	2 00	3 75	7 00
3062.	“	“	Scarlet	“	25	1 00	2 00	3 75	7 00
3064.	“	“	Vermilion	“	25	1 00	2 00	3 75	7 00
3066.	“	“	Violet	“	25	1 00	2 00	3 75	7 00
3068.	“	“	Yellow	“	25	1 00	2 00	3 75	7 00



No. 3080

No. 3080.	Tray containing assortment of any five of our inks, $\frac{3}{4}$ oz. bottles	Each, \$1 50
3082.	Tray, without ink.....	“ 35

HIGGINS' LIQUID DRAWING INK



No. 3090



No. 3096



No. 3098

			7 oz.	1/2 Pt.	Pt.	Qt.
No. 3090.	Higgins' General Black Ink.....	Each,	\$0 25	\$2 00	\$3 75	\$7 00
3092.	" Waterproof Black Ink....	"	25	2 00	3 75	7 00
3094.	" Colored Inks, made in the following colors.....	"	25	2 00	3 75	7 00

Blue	Carminc	Orange	Violet
Brick Red	Green	Scarlet	Yellow
Brown	Indigo	Vermilion	

In ordering No. 3094, please state Color of Ink desired.

			2 oz.	1/2 Pt.	Pt.	Qt.
No. 3096.	Higgins' Eternal Ink.....	Each,	\$0 10	\$0 35	\$0 60	\$1 00
3098.	" Engrossing Ink.....	"	20	60	1 00	1 75

For Ink Bottle Holders, see next page.

CLOVER INKSTAND



No. 3100

No. 3100. Clover Ink Bottle Holder to hold 3 bottles.....Each, \$0 35

INK BOTTLE HOLDER



No. 3102

No. 3102. Iron Ink Bottle Holder and Paper Weight, to hold one bottle of ink.....Each, \$0 25

W. & N.'S LIQUIDS AND PREPARATIONS

SEMPLE'S WHITE



No. 3150



No. 3152

No. 3150.	Winsor & Newton's Chinese White.....	Per bottle, \$0	30
3152.	" " Indian Ink.....	"	30
3154.	" " Blue	"	30
3156.	" " Carmine	"	30
3158.	" " Indelible Brown Ink.....	"	30
3160.	" " Prout's Brown	"	30
3162.	" " Sepia	"	30
3164.	" " Gold Ink.....	"	30
3166.	" " Oxgall	"	30
3168.	" " Vermilion	"	30
3170.	" " Chinese White in tubes, small size..	Each,	15
3172.	" " " " " large " "	"	30



No. 3180



No. 3182



No. 3184

No. 3180.	W. & N's Albanine, a pure photographic white.....	Each, \$0	30
3182.	" Process Black, a dead black of great density..	"	30
3184.	Simple's White, in jars.....	"	25

HIGGINS

HIGGINS' DRAWING BOARD & LIBRARY PASTE

THESE PASTES ARE THE MOST PERFECTLY PREPARED FOR THE PURPOSES OF DRAWING AND WRITING. THEY ARE OF A PURE WHITE COLOR, AND DO NOT DISCOLOR OR STAIN THE PAPER OR DRAWING BOARD. THEY ARE ALSO OF A VERY FINE GRAIN, AND DO NOT CRACK OR FLAKE OFF. THEY ARE ALSO OF A VERY FINE GRAIN, AND DO NOT CRACK OR FLAKE OFF. THEY ARE ALSO OF A VERY FINE GRAIN, AND DO NOT CRACK OR FLAKE OFF.

CHAS. M. HIGGINS & CO. MFGS.



WEIS BRUSH TUBE MUCILAGE

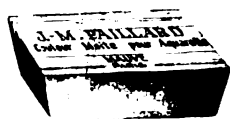
CICO LIQUID PASTE

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MOIST WATER COLORS

FINEST QUALITY

(J. M. Paillard, Paris)



In introducing the following series of moist colors we wish to call particular attention to the extra fine quality and exceptional brilliancy and beauty of the colors.

These colors are used by the leading water color artists in Paris and are specially endorsed and recommended by the directors of the principal art schools in France and elsewhere.

No. 3301—FIRST SERIES

Antwerp Blue	(Bleu Mineral)	Ivory Black	(Noir d'ivoire)
Bistre	(Bistre)	Light Red	(Brun rouge)
Blue Black	(Noir de Vigne)	Naples Yellow	(Jaune de Naples)
Brown Ochre	(Ochre Brun)	Neutral Tint	(Teinte neutre)
Brown Pink	(Stil de grain anglais)	New Blue	(Bleu de Paris)
Burnt Sienna	(Terre de Sienna, brulee)	Olive Green	(Vert Olive)
Burnt Umber	(Terre d'ombre, brulee)	Payne's Gray	(Gris du Payn)
Chinese White	(Blanc de Zinc)	Prussian Blue	(Bleu de Prusse)
Chrome Lemon	(Jaune Citron)	Prussian Green	(Vert de Prusse)
Chrome Yellow Light	(Jaune de Chrome No. 1)	Raw Sienna	(Terre de Sienna)
Chrome Yellow Deep	(Jaune de Chrome Fonce)	Raw Umber	(Terre d'ombre)
Cologne Earth	(Terre de Cologne)	Roman Ochre	(Ochre de Ru)
Dragon's Blood	(Sang de Dragon)	Red Ochre	(Ochre rouge)
Emerald Green	(Cendre Vert)	Sap Green	(Vert de vessie)
Gamboge	(Gomme Gutte)	Terre Verte	(Terre Verte)
Hooker's Green	(Vert Vegetal)	Van Dyke Brown	(Brun Van Dyke)
Indigo	(Indigo)	Yellow Lake	(Lac jaune)
Indian Red	(Rouge Indian)	Yellow Ochre	(Ochre jaune)
Italian Pink	(Stil de grain jaune)		

No. 3301. Whole Pans	}	Each, \$0 25
" Tubes	}	
3301A. Half Pans	}	Each, \$0 13
" Tubes	}	

No. 3302—SECOND SERIES

Brilliant Yellow	(Jaune Brilliant)	Rose Lake	(Laque Rose)
Burnt Lake	(Lacque Brulee)	Sepia	(Sepia Naturelle)
Crimson Lake	(Laque Carmince)	Solferino Lake	(Laque Solferino)
French Blue	(Bleu de France)	Ultramarine Blue	(Outremer)
Mauve	(Mauve)	Vermillion	(Vermillon)
Mineral Green	(Vert Mineral)	Violet Lake	(Laque Violette)

No. 3302. Whole Pans	}	Each, \$0 50
" Tubes	}	
3302A. Half Pans	}	Each, \$0 25
" Tubes	}	

MOIST WATER COLORS—Continued

No. 3303—THIRD SERIES

Brown Madder	(Brun Madder)	Marine Blue	(Bleu de Marine)
Carmine	(Carmin fin)	Mars Brown	(Brun de Mars)
Cerulean Blue	(Bleu Cœruleum)	Mars Orange	(Orange de Mars)
Chinese Vermilion	(Vermillon de Chine)	Mars Red	(Rouge de Mars)
Emerald Green	(Vert Émeraude)	Mars Violet	(Violet de Mars)
Geranium	(Geranium)	Mars Yellow	(Jaune de Mars)
Madder Lake	(Laque de Garance foncé)	Rose Carthame	(Rose Carthame)
Magenta	(Laque Magenta)		

No. 3303.	Whole Pans	}	.....	Each, \$0 60
	“ Tubes	}	.....
3303A.	Half Pans	}	.....	Each, \$0 30
	“ Tubes	}	.....

No. 3304—FOURTH SERIES

Cadmium Yellow, Light	(Jaune de Cadmium, clair)	Purple	(Pourpre)
Cadmium Yellow, Medium	(Jaune de Cadmium, moyen)	Rose Madder	(Laque de Garance Rose)
Cadmium Yellow, Dark	(Jaune de Cadmium, foncé)	Celestial Blue	(Bleu de Celeste)
Cadmium Lemon	(Citron de Cadmium)	Cobalt Green	(Vert de Cobalt)
Cobalt Blue	(Bleu de Cobalt)	Cobalt Violet	(Violet de Cobalt)

No. 3304.	Whole Pans	}	.....	Each, \$0 90
	“ Tubes	}	.....
3304A.	Half Pans	}	.....	Each, \$0 45
	“ Tubes	}	.....

No. 3305—FIFTH SERIES

Burnt Carmine	(Carmin brulé)	Gallstone	(Pierre de fiel)
Extra Carmine	(Carmin Extra)		

No. 3305.	Whole Pans	}	.....	Each, \$1 25
	“ Tubes	}	.....
3305A.	Half Pans	}	.....	Each, \$0 65
	“ Tubes	}	.....

No. 3306—SIXTH SERIES

Aureolin	(Aureoline)	Indian Yellow, Extra	(Jaune Indien, Extra)
Carmine	(Carmin)	Smalt	(Smalt)
Madder Carmine	(Laque de garance carmin)		

No. 3306.	Whole Pans	}	.....	Each, \$1 50
	“ Tubes	}	.....
3306A.	Half Pans	}	.....	Each, \$0 75
	“ Tubes	}	.....

BOURGEOIS' FRENCH WATER COLORS

IN GLASS POTS



No. 3310
28



No. 3316
306

The Pots contain double the quantity of whole pans sold by other manufacturers at nearly the same price.

They are in a moist state. The user has but to moisten his brush and slightly rub the colors desired to find that it will readily yield the full richness of its tint.

No. 3310.	2.	Antwerp Blue	22.	Chrome Yellow, Dark	46.	Light Red	
	4.	Brown Ochre	24.	Dragon's Blood	48.	Naples Yellow	
	6.	Brown Pink	26.	Emerald Green	50.	Neutral Tint	
	8.	Burnt Sienna	28.	Gamboje	52.	Olive Green	
	10.	Burnt Umber	30.	Green Lake	54.	Payne's Grey	
	12.	Chinese White	32.	Hooker's Green	56.	Prussian Blue	
	14.	Chrome Green, Light	34.	Indian Red	58.	Prussian Green	
	16.	Chrome Green, Medium	36.	Indigo	60.	Raw Sienna	
	18.	Chrome Green, Dark	38.	Italian Pink	62.	Raw Umber	
	20.	Chrome Yellow, Light	40.	Ivory Black	64.	Sap Green	
			42.	Lamp Black	68.	Terra Verte	
			44.	Lemon Yellow	70.	Van Dyke Brown	Each,
					72.	Venetian Red	\$0 30
					74.	Yellow Ochre	
No. 3312.	100.	Brilliant Yellow	112.	Ultramarine Blue	118.	Vermilion, Dark	
	102.	Celestial Blue		Light	120.	Violet Light, Extra	
	104.	Crimson Lake	114.	Ultramarine Blue	122.	Violet Dark, Extra	Each,
	106.	Dark Purple		Dark	124.	Warm Sepia	\$0 50
	108.	Scarlet Vermilion	116.	Vermilion, Light			
	110.	Sepia					
No. 3314.	200.	Brown Madder	208.	Cypress Green, Dark	216.	Rose Carthame, Light	
	202.	Carmine	210.	Geranium Rose	218.	Rose Carthame, Dark	
	204.	Cerulean Blue	212.	Madder Lake, Light	220.	Scarlet Lake,	Each,
	206.	Cypress Green, Light	214.	Madder Lake Dark			\$0 75
No. 3316.	300.	Cadmium Citron	304.	Cadmium Yellow	308.	Indian Yellow	Each,
	302.	Cadmium Deep	306.	Cobalt Blue			\$1 00

WATER COLORS WINSOR & NEWTON'S



No. 3325



No. 3325A



No. 3325B

1st Series

Antwerp Blue	Dragon's Blood
Bistre	Emerald Green
Blue Black	Flake White
Brown Ochre	Gamboge
Brown Pink	Hooker's Green No. 1
Burnt Sienna	Hooker's Green No. 2
Burnt Umber	Indian Red
Charcoal Gray	Indigo
Chinese White	Italian Pink
Chrome Lemon	Ivory Black
Chrome Yellow	King's Yellow
Chrome Deep	Lamp Black
Chrome Orange	Light Red
Cologne Earth	Mauve
	Naples Yellow
	Neutral Tint

New Blue
Olive Green
Payne's Gray
Permanent Blue
Prussian Blue
Prussian Green
Raw Sienna
Raw Umber
Roman Ochre
Sap Green
Terra Verte
Vandyke Brown
Vermilion
Venetian Red
Yellow Lake
Yellow Ochre

No. 3325. First Series.

No. 3325	Whole Pans.....	Per doz., \$3 00
3325A } 3325B }	Half Pans and Half Tubes.....	" " 1 65

2nd Series

Alizarin Carmine	Alizarin Yellow	Indian Yellow	Roman Sepia
Alizarin Crimson	Black Lead	Leitch's Blue	Ruben's Madder
Alizarin Green	Brown Madder	Mars Yellow	Scarlet Lake
Alizarin Orange	Carmine Lake	Neutral Orange	Scarlet Vermilion
	Cerulean Blue	Orange Vermilion	Sepia
	Crimson Lake	Purple Lake	Warm Sepia

No. 3326. Second Series.

No. 3326	Whole Pans.....	Per doz., \$6 00
3326A } 3326B }	Half Pans and Half Tubes.....	" " 3 00

3rd Series

Cadmium Lemon	Cobalt Green	Mars Orange	Permanent Violet
Cadmium Orange	French Blue	Emerald Oxide of Chrome	Pale Cadmium Yellow
Cadmium Yellow	Indian Purple	Oxide of Chromium	Pure Scarlet
Cobalt Blue	Intense Blue	Transparent	Ultramarine Ash Gray
	Lemon Yellow	Permanent Mauve	Viridian

No. 3328. Third Series.

No. 3328	Whole Pans.....	Per doz., \$7 50
3328A } 3328B }	Half Pans and Half Tubes.....	" " 3 75

4th Series

Aureolin	Carmine	Pink Madder	Scarlet Madder
Aurora Yellow	Field's Orange Vermilion	Primrose Aureolin	Rose Madder
Burnt Carmine	Gallstone	Purple Madder	Violet Carmine
	Madder Carmine	Rose Dorie	Yellow Carmine
	Madder Lake		

No. 3330. Fourth Series.

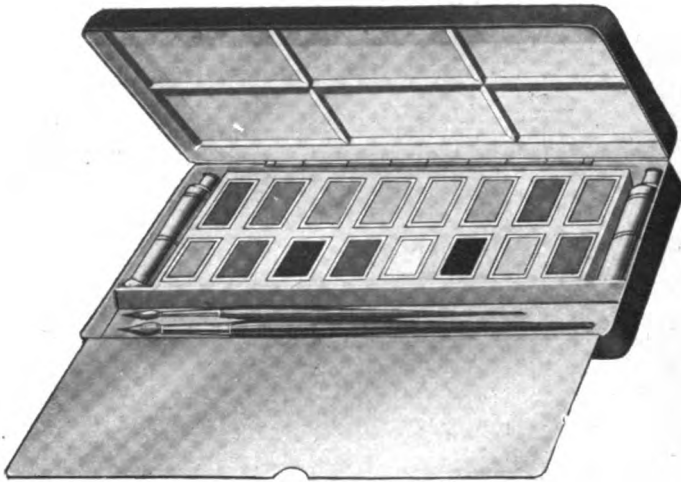
No. 3330	Whole Pans.....	Per doz., \$12 75
3330A } 3330B }	Half Pans and Half Tubes.....	" " 6 38

5th Series—Ultramarine Ash Blue

No. 3332. Fifth Series.

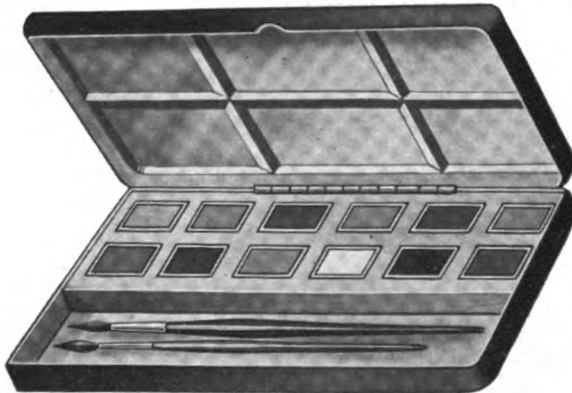
No. 3332	Whole Pans.....	Per doz., \$18 00
3332A } 3332B }	Half Pans and Half Tubes.....	" " 9 00

WATER COLOR BOXES



No. 3360

- No. 3360. Water Color Box, Japanned Tin Box, with inside lid containing an assortment of 16 fine quality moist colors in pans, 1 tube each of Chinese White and Sepia, and 2 brushes.....Per doz., \$12 00
3361. Water Color Box like No. 3360, but containing 12 colors and 1 tube each of Chinese White and Sepia and 2 brushesPer doz., 9 00



No. 3365

- No. 3365. School Water Color Box, Japanned Tin Box $6\frac{1}{2}'' \times 2\frac{1}{4}''$, containing 12 moist colors in metal pans and 2 brushes....Per doz., \$5 00

EMPTY JAPANNED TIN BOXES

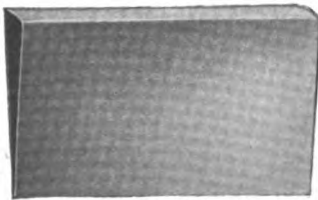
For Moist Colors, in Pans



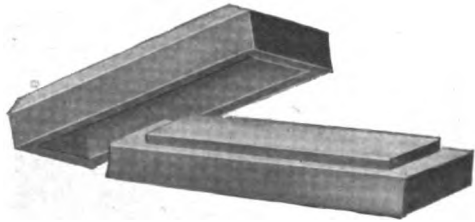
No. 3370

No. 3370.	For 6 Whole or 12 Half	Pans.....	Each, \$0 80
3371.	" 8 " " 16 " "	.....	" 90
3372.	" 10 " " 20 " "	.....	" 1 05
3373.	" 12 " " 24 " "	.....	" 1 15
3374.	" 16 " " 32 " "	.....	" 1 30
3375.	" 18 " " 36 " "	.....	" 1 40
3376.	" 24 " " 48 " "	.....	" 1 60

ARKANSAS OIL STONES



No. 3380.

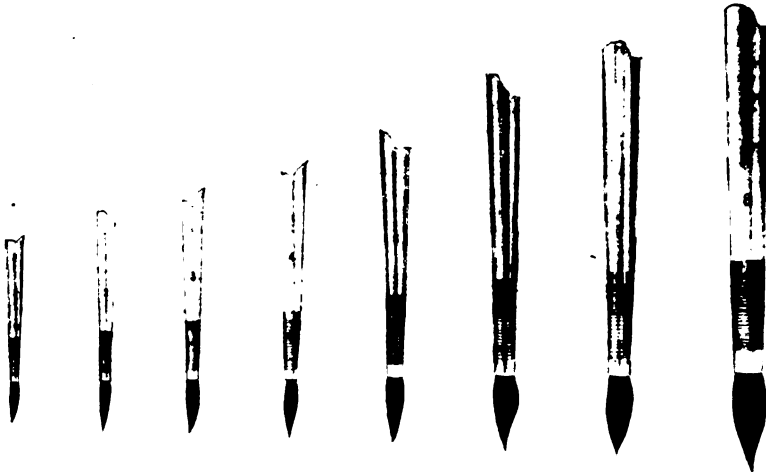


No. 3383.

No. 3380.	Arkansas Oil Stone, wedge shape slip.....	Each \$0 30
3381.	" " " " about $1\frac{1}{4} \times 3$ ".....	" 50
3382.	" " " " " $1\frac{1}{4} \times 4\frac{1}{8}$ ".....	" 90
3383.	" " " in case, with cover, 3".....	" 75
3384.	" " " " " 5".....	" 2 00

QUILL BRUSHES

Illustrations & Size



No. 3400

No. 3400. Camel Hair in Quills.

Nos.....	1	2	3	4	5	6	7	8
Each.....	\$0 05	05	06	06	08	08	10	10

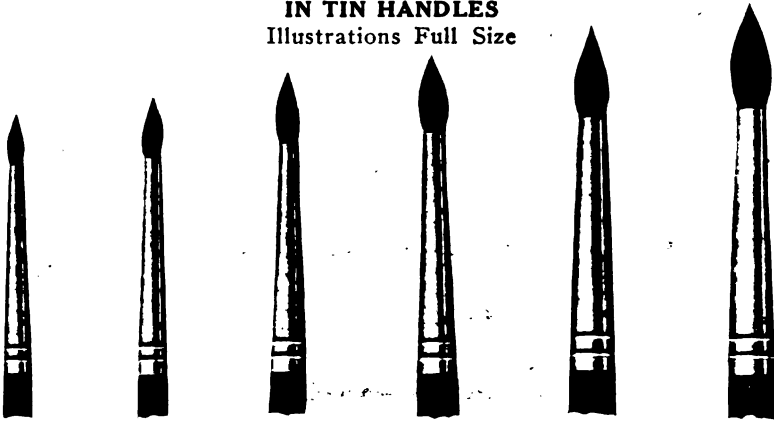
No. 3402. Red Sable in Quills.

Nos.....	1	2	3	4	5	6	7	8
Each.....	\$0 15	25	35	45	55	65	85	1 00

CAMEL HAIR BRUSHES

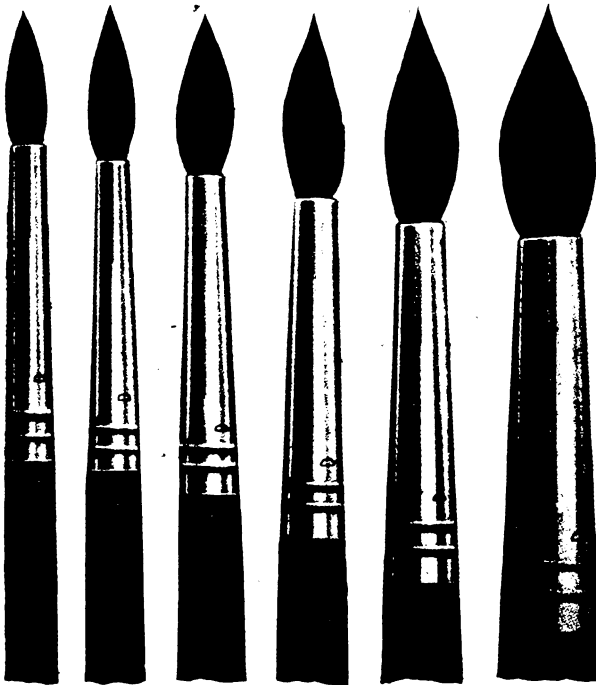
IN TIN HANDLES

Illustrations Full Size



No. 3410

	Nos.	1	2	3	4	5	6
No. 3410. Camel Hair Brushes.....	Each,	06	08	08	10	10	12



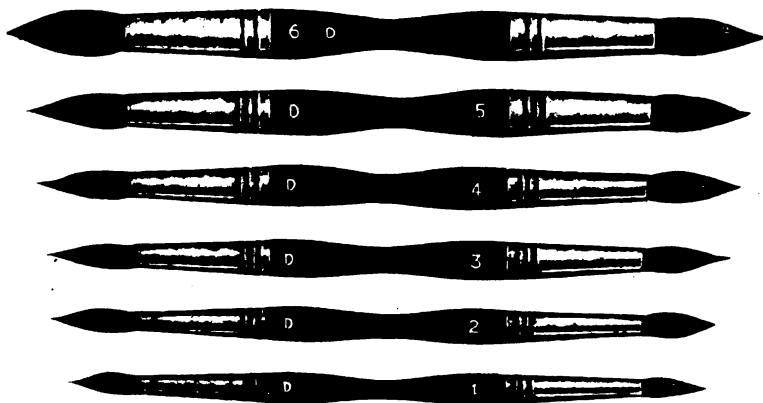
No. 3410

	Nos.	7	8	9	10	11	12
No. 3410. Camel Hair Brushes.....	Each,	18	20	20	25	30	35

DOUBLE POINTED BRUSHES

Of Camel Hair and Red Sable

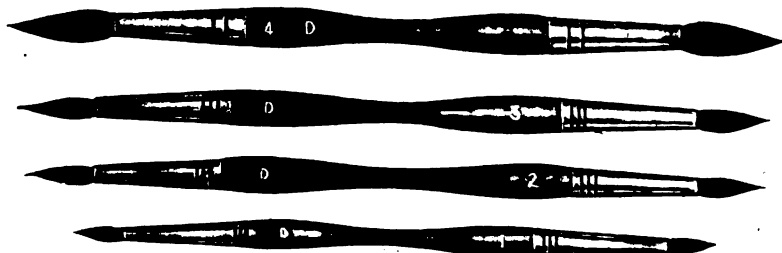
Illustration $\frac{1}{2}$ Size



No. 3415

No. 3415. Double-pointed Camel Hair Brushes, in Tin.

Nos.....	1	2	3	4	5	6
Each.....	\$0 25	30	35	45	55	60



No. 3420

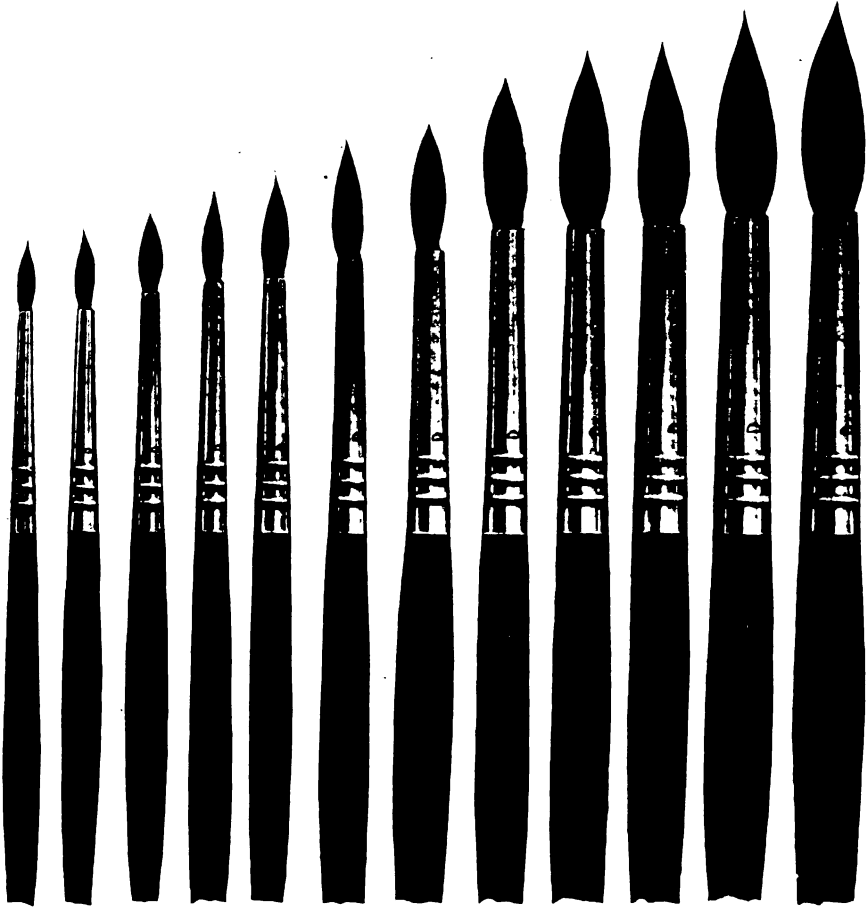
No. 3420. Double-pointed Red Sable Brushes, in Albata.

Nos.....	1	2	3	4
Each.....	\$0 60	90	1 50	2 40

RED SABLE BRUSHES

In Albata, with Handle

Illustration Full Size

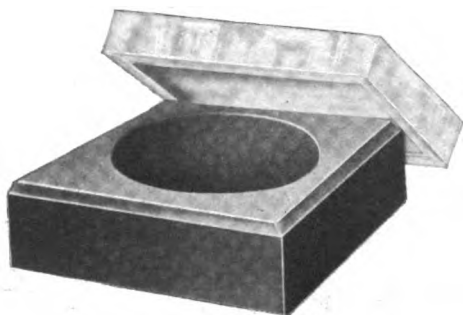


No. 3425

No. 3425. Red Sable Brushes, in Albata, with Handle.

Nos.....	1	2	3	4	5	6	7	8	9	10	11	12
Each.....	15	18	25	30	40	55	70	90	1 20	1 50	2 00	2 50

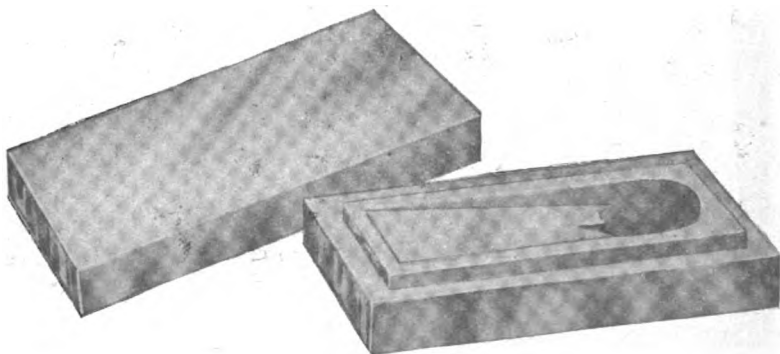
INK AND COLOR SLABS AND TILES



No. 3450

- No. 3450. Slate Ink Slab, with heavy glass cover, $3\frac{1}{2} \times 3\frac{1}{2}$ ", with improved well.....Each, \$0 45
3452. Slate Ink Slab, with heavy plate glass cover, $3\frac{1}{2} \times 3\frac{1}{2}$ ", with edges unground..... " 35

CHINA INK SLABS



No. 3454

- No. 3454. China Ink Slab, with cover, $1\frac{1}{2} \times 4\frac{1}{2}$ ".....Each, \$0 35
3456. " " " " " $2\frac{1}{2} \times 5\frac{1}{2}$ "..... " 40

NESTS OF CABINET SAUCERS



No. 3460

No. 3460.	Nest of Cabinet Saucers, 6 in set, 2 $\frac{1}{2}$ "	Each	\$0 55
3461.	" " " " 6 " 2 $\frac{1}{8}$ "	"	65
3462.	" " " " 6 " 3 $\frac{1}{4}$ "	"	75
3463.	" " " " 6 " 3 $\frac{1}{2}$ "	"	90
3464.	" " " " deep, 4 in set, 2 $\frac{1}{2}$ "	"	75
3465.	" " " " " 4 " " 3 $\frac{1}{4}$ "	"	90
3466.	" " " " " 4 " " 3 $\frac{1}{2}$ "	"	1 10

INK AND COLOR SLABS



No. 3470



No. 3472

No. 3470.	Color Slabs, 3 wells and 3 slopes, 2 $\frac{1}{2}$ \times 4 "	Each	\$0 25
3471.	" " 5 " " 5 " 4 \times 7 $\frac{1}{2}$ "	"	60
3472.	Sloping Tiles, 5 divisions, 3 $\frac{1}{8}$ \times 7 $\frac{1}{2}$ "	"	40
3473.	" " 6 " 3 $\frac{1}{8}$ \times 7 $\frac{1}{2}$ "	"	40
3474.	" " 8 " 6 \times 7 $\frac{1}{8}$ "	"	60

INK AND COLOR SLABS—Continued



No. 3480

No. 3480.	China Color Cups.....	2½"	3"	3½" diameter.	
	Each.....	\$0 07	10	20	
3481.	China Brush Rest, 5½" long.....			Each, \$0 15	
3482.	Architects' Slant and Basin, 8 divisions and cup, 7" diameter.....			"	1 35

ARTISTS' WATER GLASSES



No. 3485

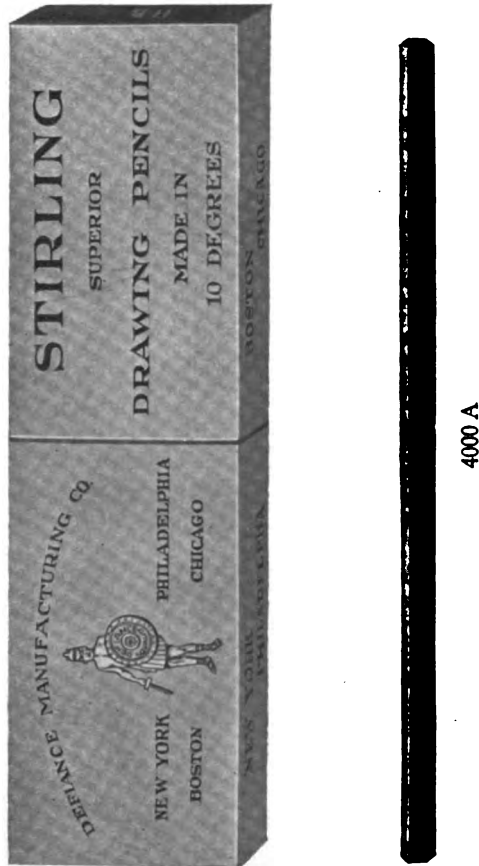
No. 3485.	Artists' Water Glasses, 2½" diameter.....				Each, \$0 12
3486.	" " " 3½" "			"	25
3487.	" " " 4½" "			"	35

CHARCOAL

No. 3488.	Charcoal, fine, 50 sticks in box.....			Per dozen boxes, \$1 75
3489.	" Venetian, 50 sticks in box.....	"	"	" 6 00

STIRLING DRAWING PENCILS

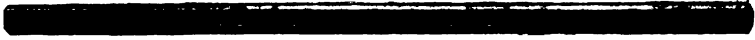
The Stirling Drawing Pencils are of excellent quality, containing selected compressed graphite, uniformly graded and free from grit. Made in 10 degrees of hardness. Especially adapted for Draftsmen, Architects and Engineers.



No. 4000

No. 4000. Stirling Drawing Pencil, hexagon shape, yellow, polished and stamped in gilt in the following degrees: 2B, B, HB, F, H, 2H, 3H, 4H, 5H, 6H.....Per doz., \$0 60

“DEFIANCE” DETAIL PENCILS



No. 4005

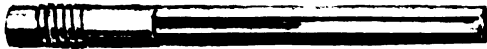
- No. 4005. Defiance Detail Drawing Pencils in 4 degrees: BB, HB, H, HH.....Per doz., \$0 50



No. 4006

- No. 4006. Defiance “Special” Drawing Pencils with red rubber tip, in 4 degrees, 1, 2, 3, 4.....Per doz., \$0 60

PENCIL HOLDERS



No. 4010

- No. 4010. Hexagon Cedar Pencil Holders.....Each, \$0 05



No. 4012

- No. 4012. Plain Point Protector, round.....Each, \$0 05



No. 4014

- No. 4014. Nickel Point Protector, with rubber tip.....Each, \$0 10

JOHANN FABER'S PENCILS



No. 4050 .

- No. 4050. "Apollo" Finest Drawing Pencil. The new "Apollo" Pencil is the perfection of all drawing pencils. Keeps the point admirably, combines smoothness and firmness. Made in 15 degrees, 6B to 7H.....Each, \$0 10 Doz., \$1 00
4052. "Apollo" Copying Pencils. The finest quality copying pencil, of medium hardness.....Each, \$0 10 Doz., \$1 00



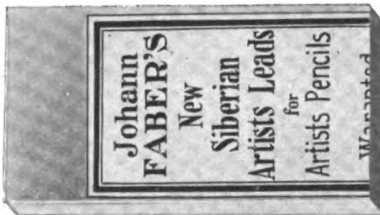
No. 4060

Siberian Artists' Pencils, Hexagon

- No. 4060. Single Pointed HB to 6H.....Each, \$0 15
4062. Double Pointed F to 2H....." 25

ARTISTS' LEADS

In Boxes of 6 Leads Each



No. 4065

- No. 4065. Siberian Artists' Leads HB to 6H.....Per box, \$0 30

HARDTMUTH'S KOH-I-NOOR PENCILS

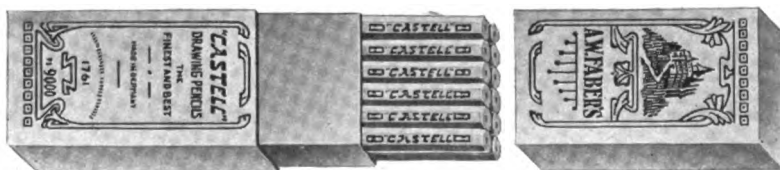


No. 4070

No. 4070. Koh-i-noor Pencils, Hexagon, Yellow Finish. In degrees as follows: 3B, 2B, B, HB, F, H, 2H, 3H, 4H, 5H, 6H, 7H, 8H, 9H, 6B, 5B, 4B.....Per doz., \$1 25

4072. Koh-i-noor Copying Pencils..... " " 1 25

A. W. FABER'S CASTELL PENCILS



No. 4080

No. 4080. Castell Pencils, Hexagon, very best, Green Polish. In degrees as follows: 6B, 5B, 4B, 3B, 2B, B, HB, F, H, 2H, 3H, 4H, 5H, 6H, 7H, 8H.....Per doz., \$1 25



No. 4082

4082. Castell Copying Pencils..... " " 1 25

MEPHISTO COPYING PENCILS



No. 4090

No. 4090.	Mephisto Pencils (73B).....	Per doz.,	\$0 75
4092.	" " (73B) hard.....	" "	85
4094.	" " (77) with Red Tip.....	" "	85

LUMBER CRAYONS



No. 4100

No. 4100.	Dixon's Best Solid Crayons, Blue, round, 7 in.....	Per doz.,	\$1 00
4102.	" " " " Black, " 7 in.....	" "	1 00
4104.	" " " " Green, " 7 in.....	" "	1 00
4106.	" " " " Red, " 7 in.....	" "	1 00
4107.	" " " " Yellow " 7 in.....	" "	1 00



No. 4110

No. 4110.	Dixon's Solid Crayon Holder, nickel-plated, 6½ in., for Crayons Nos. 4100-4107.....	Per doz.,	\$0 60
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No. 4122

No. 4120.	Dixon's Lumber Crayons, Blue, hexagon.....	Per doz.,	\$1 20
4122.	" " " " Green, "	" "	1 20
4124.	" " " " Red "	" "	1 20
4126.	" " " " Ter. Cotta, "	" "	1 20
4128.	" " " " White, "	" "	1 20
4130.	" " " " Yellow, "	" "	1 20
4132.	" " " " Black, " Extra soft "	" "	1 00
4140.	Red Keel, in lumps.....	Per lb.,	15

BLAISDELL'S PAPER PENCILS AND CRAYONS



No. 4150.

No. 4150.	Blaisdell's Paper Pencils, plain, grade No. 2.....	Per doz., \$0 50
4151.	“ “ “ with rubber tip, grade No. 2. “ “	60



No. 4152

No. 4152.	Blaisdell's Crayons, Blue	Per doz., \$0 90
“	“ Red	“ “ 90
“	“ Black	“ “ 90
“	“ Green	“ “ 90
“	“ Yellow	“ “ 90
“	“ Brown	“ “ 90
“	“ White	“ “ 90

“DEFIANCE” LUMBER CRAYONS

Extra Large Size



No. 4200

No. 4200.	Defiance Lumber Crayons, Blue, hexagon.....	Per doz., \$0 80
“	“ Black, “	“ “ 80
“	“ Green, “	“ “ 80
“	“ Red “	“ “ 80
“	“ Brown “	“ “ 80
“	“ Yellow “	“ “ 80

POLYCHROMOS WAX CRAYONS

No. 4250

The Finest and Best Assorted, in 60 Shades

No. 4250. A. W. Faber's Polychromos Wax Crayons..... Each Per Doz.
\$0 10 \$1 00

1. White	21. Light Blue	41. Raw Sienna
2. Zinc Yellow	22. Sky Blue	42. Gold Ochre
3. Lemon Cadmium	23. Cobalt Blue	43. Burnt Yellow Ochre
4. Light Chrome	24. Ultramarine	44. Brown Ochre
5. Light Cadmium	25. Paris Blue	45. Burnt Sienna
6. Dark Cadmium	26. Prussian Blue	46. Venetian Red
7. Naples Yellow	27. Indigo	47. Brick Red
8. Dark Chrome	28. Delft Blue	48. Terra Cotta
9. Orange	29. Red Violet Lake	49. Indian Red
10. Terre Verte	30. Blue Violet Lake	50. Burnt Carmine
11. Olive Green	31. Pink Madder Lake	51. Raw Umber
12. Mineral Green	32. Madder Carmine	52. Bistre
13. French Green	33. Rose Pink	53. Van Dyke Brown
14. Green Bice	34. Carmine Lake	54. Burnt Umber
15. Sap Green	35. " Extrafine	55. Sepia
16. Hooker's Green, No. 1	36. Scarlet Lake	56. Warm Sepia
17. Hooker's Green, No. 2	37. Saturn Red	57. Light Grey
18. Viridian	38. Pale Vermilion	58. Neutral Tint
19. Vegetable Green	39. Dark Vermilion	59. Payne's Grey
20. Prussian Green	40. Light Ochre	60. Ivory Black

No. 4254. A. W. Faber's Polychromos Wax Crayons, in boxes.

Assorted colors..... 6 12 18 24 36 48
\$0 75 1 10 1 65 2 15 3 00 4 00

FABER'S COLORED PENCILS

JOHANN FABER'S FINEST RED.

No. 4260

No. 4260. Red and Blue Pencil, Hexagon, Best.....	Per doz., \$1 25
4262. " " " " Round	" " 75
4264. Red Pencils, Round.....	" " 75
4266. Blue Pencils, Round.....	" " 75
4268. Yellow Pencils, Round.....	" " 75
4270. Brown Pencils, Round.....	" " 75
4272. Green Pencils, Round.....	" " 75

RUBBER PENCIL ERASERS



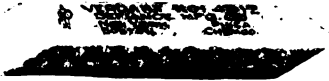
No. 4505.

No. 4506.	Verdant Eraser, green, oblong, beveled, 3 sizes.			
	Pieces to the box.....	48	24	12
	Per piece.....	\$0 06	\$0 12	\$0 25
	Per box.....			2 50

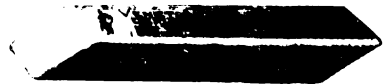


No. 4508.

No. 4508.	Venetian Eraser, red, oblong, beveled, 3 sizes.			
	Pieces to the box.....	48	24	12
	Per piece.....	\$0 06	\$0 12	\$0 25
	Per box.....			2 50



No. 4512.



No. 4516.

Venetian and Verdant Erasers, oblong, beveled on both ends in 2 sizes.

No. 4512.	Green, small.....	Per doz.	\$0 60
4514.	" large.....	" "	1 20
4516.	Red, small.....	" "	60
4518.	" large.....	" "	1 20



No. 4522

No. 4522.	Grey, flexible erasers, flat, 6 sizes.					
4524.	Pink, " 6 " "	40	30	20	12	8
	Pieces to the box.....					
	Per piece.....	\$0 06	\$0 08	\$0 12	\$0 20	\$0 30
	Per box.....					2 25

RUBBER INK ERASERS



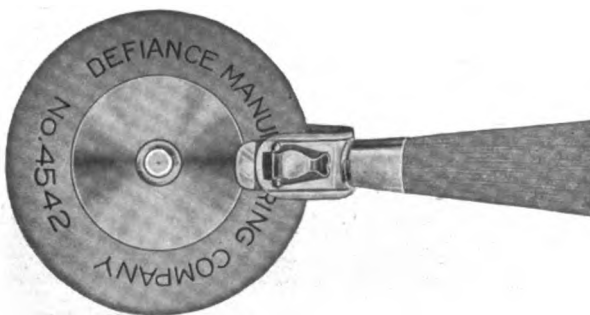
No. 4538.

No. 4538.	Typewriter Eraser, small.....	Per doz.	\$0 60
4540.	" " large.....	" "	1 20



No. 4542.

No. 4542.	Circular Ink and Typewriter Eraser.....	Per doz.	\$0 60
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No. 4544.

4544.	Improved Ink and Typewriter Eraser, with detachable brush.....	" "	1 20
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RUBBER INK ERASERS—Continued



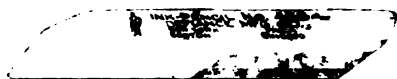
No. 4548.

No. 4548. Improved Ink Eraser, small.....	Per box of 48	\$2 50
	Each	06



No. 4550.

No. 4550. Improved Ink Eraser, large.....	Per box of 24	\$2 50
	Each	12



No. 5554.



No. 4556.

No. 4554. Ink and Pencil Eraser, small.....	Per doz.	\$0 60
4556. " " " " large.....	" "	1 20

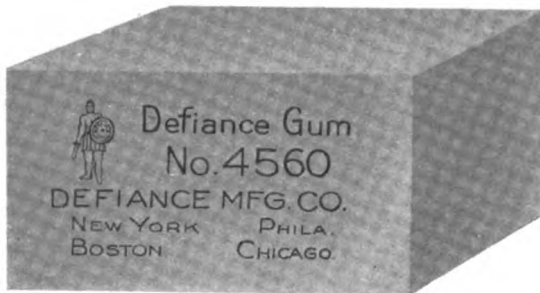
KNEADED RUBBER



No. 4558.

No. 4558.	Kneaded Rubber, small.....	Per doz.	\$0 60
4559.	" " large.....	" "	1 20

"DEFIANCE" GUM



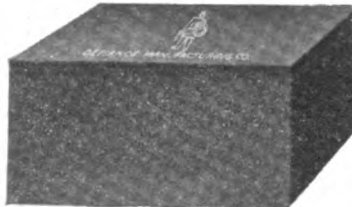
No. 4560.

For cleaning drawings, paintings, paper, etc. Soft and entirely free from grit. Does not injure the surface of paper.

No. 4560.	Small size, $2 \times 1 \times 1$ ".....	Each	\$0 07
	Medium " $2\frac{1}{2} \times 1\frac{1}{2} \times 1\frac{1}{2}$ ".....	"	10
	Large " $3 \times 2 \times 1$ ".....	"	15

SPONGE RUBBER

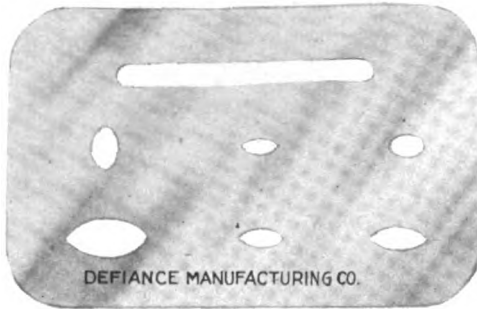
For Cleaning Drawings



No. 4562.

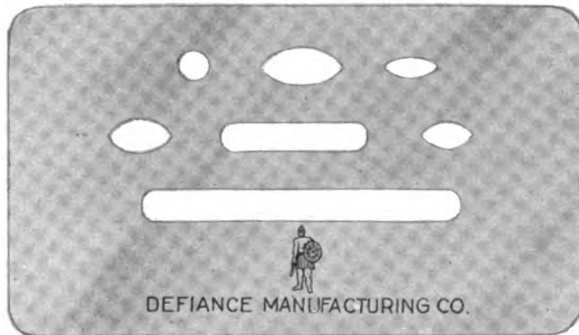
No. 4562A.	Sponge Rubber, $1 \times 1 \times 1$ ".....	Each	\$0 10
4562B.	" " $2 \times 2 \times 1$ ".....	"	25
4562C.	" " $4 \times 2 \times 1$ ".....	"	50
4562D.	" " $6 \times 4 \times 1$ ".....	"	1 50

ERASING SHIELDS



No. 4570.

No. 4570. Metal Erasing Shield, Nickel-plated, $2\frac{1}{2} \times 3\frac{1}{2}$ ".....Each \$0 20



No. 4580.

No. 4580. Celluloid Erasing Shield, transparent, $2\frac{1}{2} \times 4\frac{1}{2}$ ".....Each \$0 20

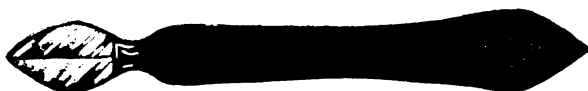
4581. " " " " 3 x 5 "..... " 25

STEEL ERASERS



No. 4594.

No. 4590.	Steel Eraser, with knife blade, bone handle, Domestic..	Each	\$0 50
4592.	" " " " " " " Imported..	"	90
4594.	" " " " " cocoa handle, Domestic..	"	45
4596.	" " " " " " " Imported..	"	80



No. 4604.

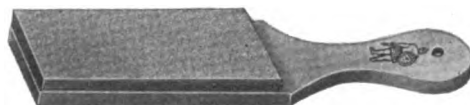
No. 4600.	Steel Eraser, with spear blade, bone handle, Domestic..	Each	\$0 50
4602.	" " " " " " " Imported..	"	75
4604.	" " " " " cocoa handle, Domestic..	"	35
4606.	" " " " " " " Imported..	"	60

PENCIL POINTERS



No. 4610.

No. 4610.	Steel Pencil Pointer and Tack Lifter.....	Each	\$0 25
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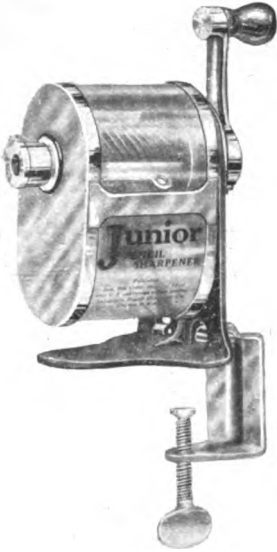


No. 4616.

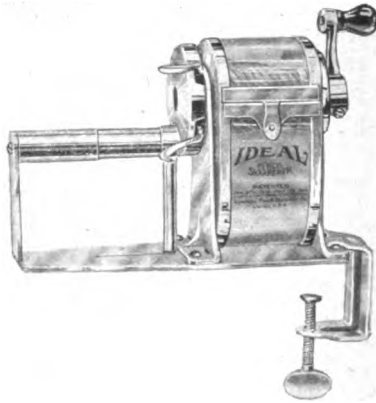
No. 4612.	Pencil Pointer, $1\frac{1}{2} \times 4$ ".....	Each	\$0 10
4614.	" " $2\frac{1}{2} \times 4$ ".....	"	12
4616.	" " $1\frac{1}{2} \times 4$ " with handle.....	"	15
4618.	" " $2\frac{1}{2} \times 4$ " " ".....	"	20

These pencil pointers consist of 12 sheets of flint paper made into a block.

PENCIL SHARPENERS



No. 4622.



No. 4626.

No. 4620.	The Chicago Pencil Sharpener.....	Each	\$1 00
	Desk Clamp.....	Extra, "	25
	Extra Cutters.....	Per Pair	50
No. 4622.	The Junior Pencil Sharpener, with Desk Clamp.....	Each	\$2 50
	Extra Cutters.....	Per Pair	50
No. 4624.	The Dandy Automatic Feed Pencil Sharpener, with		
	Desk Clamp.....	Each	\$4 00
	Extra Cutters.....	Per Pair	75
No. 4626.	The Ideal Automatic Feed Pencil Sharpener, nickel		
	plated finish, with Desk Clamp.....	Each	\$5 00
	Extra Cutters.....	Per Pair	75



No. 4628.

No. 4628.	Acme Pencil Sharpener, with double edge reversible		
	blade	Each	\$0 25

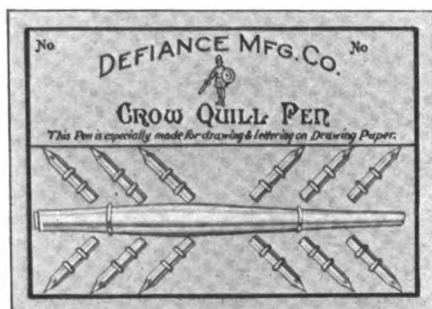
“DEFIANCE” STEEL PENS

Drawing and Lettering Pens No. 4644 and Crow Quill Pens No. 4648 were designed especially for drawing and lettering on drawing paper. They have long nibs and less sharp points than most others. They possess more elasticity and permit of more rapid lettering and drawing without scratching or catching in the grain of the paper.



No. 4644.

No. 4642.	Defiance Drawing and Lettering Pens, 1 doz. in box..	Per doz. \$0 50
4644.	“ “ “ “ “ 1 doz. No. 4642	
	on a card with holder.....	Per card 60



No. 4650.

No. 4648.	Defiance Crow Quill Pens, 1 doz. in box.....	Per doz. \$0 50
4650.	“ “ “ “ “ 1 doz. No. 4648 on a card	
	with holder.....	Per card 60

“DEFIANCE” STEEL PENS—Continued



No. 4662.

No. 4660.	Defiance Lithographic Pens, 1 doz. in box.....	Per doz. \$0 50
4662.	“ “ “ “ 1 doz. No. 4660 on a card	
	with holder.....	Per card 60

The above pens differ from all other lithographic pens in having shorter and therefore firmer nibs, with extra fine points.



No. 4664.

No. 4664.	Defiance Crow Quill Pens, No. 4660, with improved holder and cork finger piece, 10 pens on a card, each with holder.	
	Per card.....	\$1 00
	Each	10

JOSEPH GILLOTT'S
Lithographic Crow-Quill

No 699

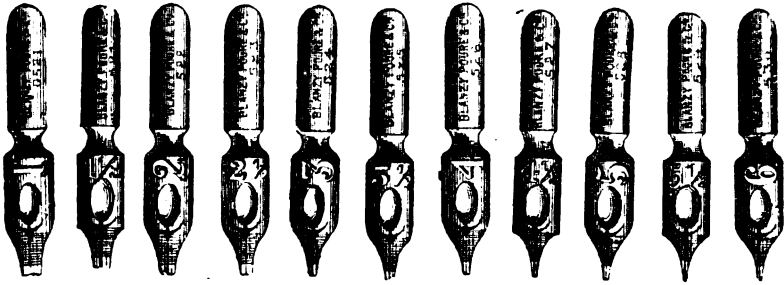
PENHOLDERS



No. 4690. Improved Crow Quill Penholder, without pen.....Each \$0 05
A holder for Crow Quill Pens of the thickness of an ordinary penholder.

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ROUND WRITING PENS



No. 4700.

No. 4700.	Single Pointed Pens, per $\frac{1}{4}$ gross of any one size.....	\$0 20
4702.	“ “ “ per gross of any one size.....	70
4704.	Assortment of 12 Single Pointed Pens on card.....	Per card 12
4706.	Methodical Text Book to Round Writing.....	Each 70
4708.	Round Writing Copy Book, without text.....	“ 45
4710.	Assortment of 12 Double Pointed Pens, 6 different kinds, on card with penholder.....	Per card 25
4712.	Assortment of Single and Double Pointed Pens, 25 in box.....	Per box 40



No. 4722.

No. 4720.	Inkholders for Single or Double Pointed Pens.....	Each \$0 05
4722.	Penholder for Round Writing Pens, double end.....	“ 10

LEONHARDT'S BALL-POINTED PENS



No. 4730.



No. 4734.



No. 4732.



No. 4736.

No. 4730.	Leonhardt's Ball Pointed Pens, 506F	Per gross \$1 35
4732.	“ “ “ “ 506EF	“ “ 1 35
4734.	“ “ “ “ 516F	“ “ 1 35
4736.	“ “ “ “ 516EF	“ “ 1 35

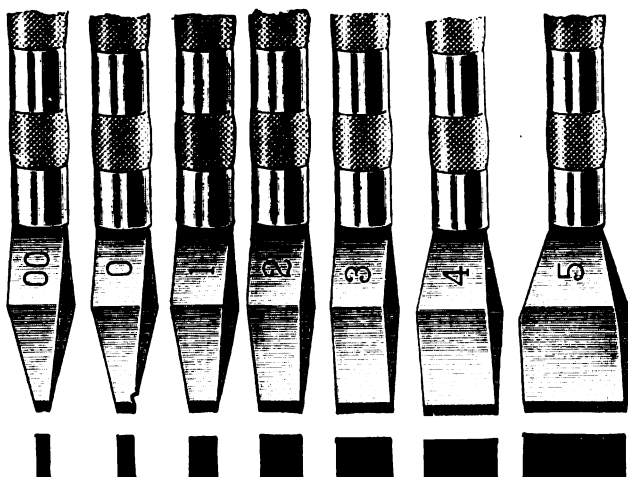
AUTOMATIC SHADING PENS



No. 4740.

No. 4740. Automatic Shading Pens.....	0	1	2	3	4	5	
Width of nib.....	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	Each \$0 20

AUTOMATIC MARKING PENS

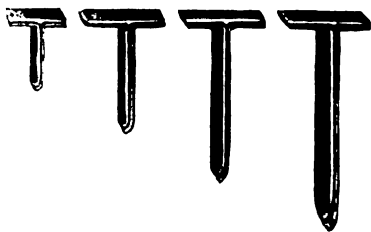


No. 4750.

No. 4750. Automatic Marking Pens.....	00	0	1	2	3	4	5	
Width of nib.....	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	Each \$0 20

4752. Shading and Marking Pen Ink, in colors as follows:
 Black, Dark Blue, Green, Purple, Scarlet, Yellow, Orange,
 Dark Brown.....Per 1 oz. bottle \$0 20

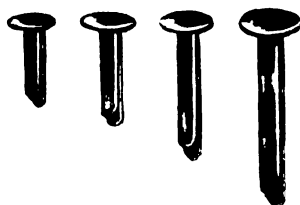
PAPER FASTENERS



No. 4760.

No. 4760. Paper Fasteners, flat heads.

Number	1	2	3	4
Length	$\frac{1}{4}$ "	$\frac{1}{2}$ "	$\frac{3}{4}$ "	1"
Per box of 100.....	\$0 15	0 20	0 25	0 30



No. 4762.

4762. Paper Fasteners, round heads.

Number	1	2	3	4
Length	$\frac{1}{4}$ "	$\frac{1}{2}$ "	$\frac{3}{4}$ "	1"
Per box of 100.....	\$0 20	0 25	0 30	0 40

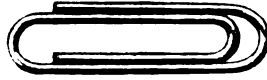
PAPER CLIPS



No. 4770.



No. 4772.



No. 4774.

No. 4770.	Clinch Clip,	250 in box.....	Per box	\$0 12
4772.	Weis	" 100 " "	" "	12
4774.	Gem	" 100 " "	" "	15

"DEFIANCE" CLIPS



No. 4780.

No. 4780.	Defiance Clip,	(1A) 1½" wide.....	Per doz.	\$0 15
"	"	(2A) 2" "	" "	20
"	"	(3A) 2¼" "	" "	30
"	"	(4A) 2½" "	" "	40
"	"	(5A) 3½" "	" "	50
"	"	(6A) 5¼" "	" "	60

STEEL MEASURING TAPES

CHESTERMAN'S

Steel Ribbon $\frac{3}{8}$ inch wide



No. 4800.

Chesterman's Steel Tapes, Red Leather Case, steel ribbon $\frac{3}{8}$ " wide, flush handle. Graduations begin at end of ring.

		Feet	25	33	50	66	75	100
No. 4800.	Divided 10ths of feet							
	and links.....	Each	\$4 50	5 25	7 20	9 20	10 40	12 80
4802.	Divided 12ths of feet							
	and links.....	"	\$4 50	5 25	7 20	9 20	10 40	12 80

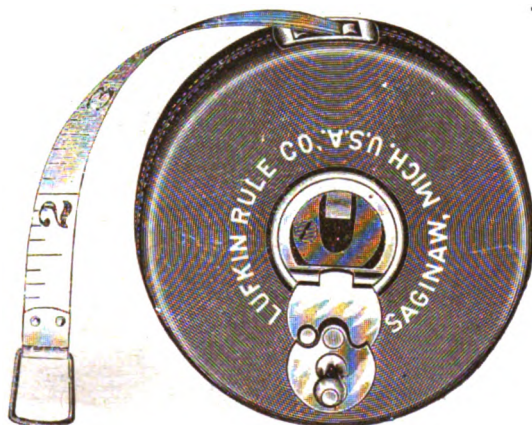
TAPES OF OTHER LENGTHS OR DIVISIONS MADE TO ORDER

Repairs on Steel Tapes of all kinds promptly attended to at moderate charges

STEEL MEASURING TAPES—Continued

“RELIABLE”

Steel Ribbon $\frac{3}{8}$ inch wide with instantaneous readings



No. 4804.

Reliable Steel Tapes, metal lined hard leather cases, double folding flush handle, opened by pressing pin on opposite side, nickel-plated mountings. Graduations (guaranteed), begin at end of ring.

No. 4804. Divided feet, inches and 8ths, links on back.

Feet	25	33	50	66	75	100	150	200
Each	\$4 50	5 20	7 20	9 20	10 40	12 80	18 50	24 00

4806. Divided feet, 10ths and 100ths, links on back.

Feet	25	33	50	66	75	100	150	200
Each	\$4 50	5 20	7 20	9 20	10 40	12 80	18 50	24 00

4808. Divided metric, one side only.

Meters	10	15	20	25	30
Each	\$5 20	7 20	9 20	11 10	12 80

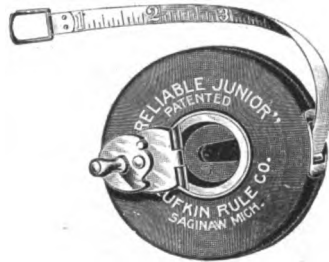
4810. With double graduations, Metric and English.

Meters	7½	10	15	20	22	25	30
Feet	25	33	50	66	75	82	100
Each	\$5 00	5 85	8 20	10 50	11 90	12 75	14 80

STEEL MEASURING TAPES—Continued

“RELIABLE JUNIOR”

Steel Ribbon $\frac{1}{4}$ inch wide with instantaneous readings



No. 4820.

“Reliable Junior” Tapes, metal lined hard leather cases, double folding flush handle, opened by pressing pin on opposite side. Nickel-plated mountings. Graduations (guaranteed), begin at end of ring. A very convenient vest pocket tape, combining utility with lightness.

No. 4820. Divided feet, inches and 16ths, one side only.

Feet	25	33	50	66	75	100
Each	\$3 75	4 00	4 60	5 25	5 75	7 00

4822. Divided feet, 10ths and 100ths, one side only.

Feet	25	33	50	66	75	100
Each	\$3 75	4 00	4 60	5 25	5 75	7 00

4824. Divided Metric, one side only.

Meters	10	15	20	25	30
Each	\$4 00	4 60	5 25	6 40	7 00

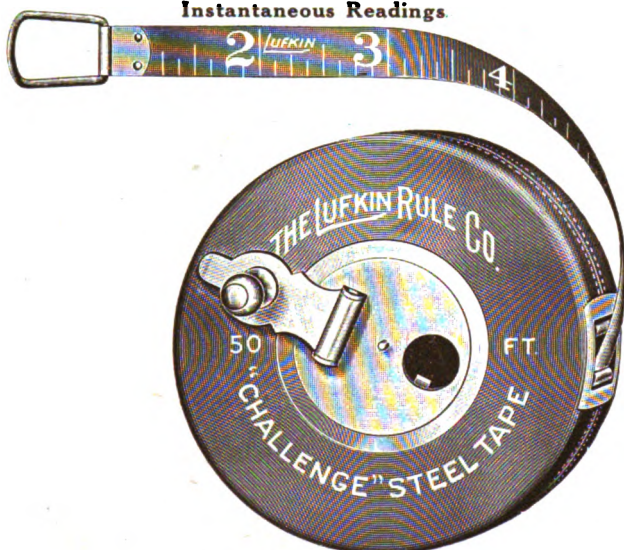
4826. Double graduations, Metric and English.

Meters	7½	10	15	20	22	25	30
Feet	25	33	50	66	75	82	100
Each	\$4 25	4 65	5 60	6 60	7 25	8 00	9 00

STEEL MEASURING TAPES—Continued

"CHALLENGE"

Instantaneous Readings.



No. 4830.

Metal lined hard leather case, nickel-plated mountings, folding flush handle, opened by pressing pin on opposite side. Graduations (guaranteed), begin at end of ring.

No. 4830.	$\frac{1}{2}$ " wide, divided feet, inches and 8ths, one side only.						
	Feet	25	33	50	66	75	100
	Each	\$3 75	4 00	4 50	5 50	6 00	7 50
4831.	$\frac{1}{4}$ " wide, divided feet, 10ths and 100ths, one side only.						
	Feet	25	33	50	66	75	100
	Each	\$3 75	4 00	4 50	5 50	6 00	7 50
4832.	$\frac{1}{2}$ " wide, divided Metric, one side only.						
	Meters	10	15	20	25	30	50
	Each	\$4 00	4 50	5 50	6 75	7 50	13 00
4833.	$\frac{3}{4}$ " wide, divided feet, inches and 8ths, one side only.						
	Feet	25	33	50	66	75	100
	Each	\$3 25	3 50	4 00	5 00	5 25	6 75
4834.	$\frac{3}{4}$ " wide, divided feet, 10ths and 100ths, one side only.						
	Feet	25	33	50	66	75	100
	Each	\$3 25	3 50	4 00	5 00	5 25	6 75
4835.	$\frac{3}{4}$ " wide, divided Metric, one side only.						
	Meters	10	15	20	25	30	50
	Each	\$3 50	4 00	5 00	6 00	6 75	12 00

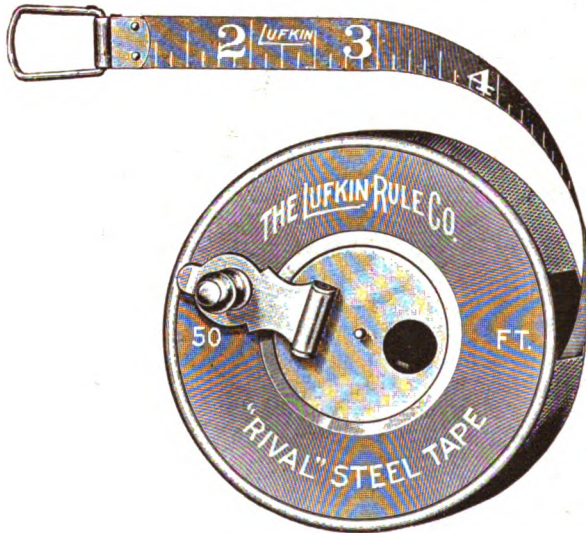
"Challenge Junior" Steel Measuring Tapes, $\frac{1}{2}$ " wide, metal lined, hard case, nickel-plated mountings. A very convenient vest pocket tape. 25-foot tape weighs only 3 ounces, 50-foot, 5 ounces.

No. 4836.	Divided feet, inches and 16ths, one side only.						
	Feet	25	33	50	66	75	100
	Each	\$3 00	3 25	3 50	4 00	4 50	5 75
4838.	Divided feet, 10ths and 100ths, one side only.						
	Feet	25	33	50	66	75	100
	Each	\$3 00	3 25	3 50	4 00	4 50	5 75

STEEL MEASURING TAPES—Continued

"RIVAL"

Instantaneous Readings with $\frac{3}{8}$ inch Ribbon



No. 4840.

Nickel-plated steel cases, folding flush handle, opened by pressing pin on opposite side. Graduations (guaranteed) begin at end of ring.

No. 4840. Divided feet, inches and 8ths, one side only.							
Feet	25	33	50	66	75	100	
Each	\$2 75	3 00	3 40	4 25	4 50	5 75	
4842. Divided feet, 10ths and 100ths, one side only.							
Feet	25	33	50	66	75	100	
Each	\$2 75	3 00	3 40	4 25	4 50	5 75	
4844. Divided Metric, one side only.							
Meters	10	15	20	25	30		
Each	\$3 00	3 40	4 25	5 10	5 75		

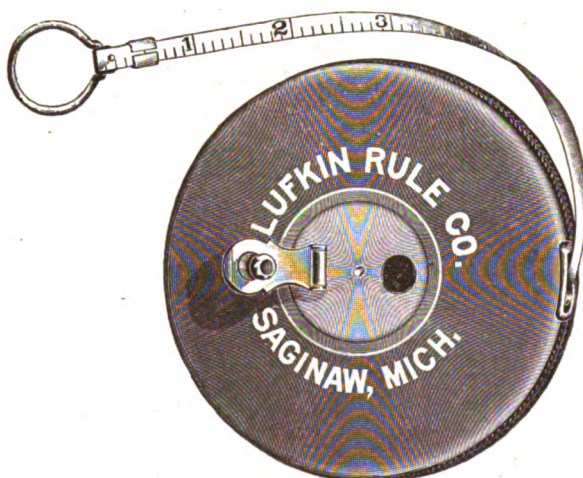
"Rival Junior" Steel Tapes, $\frac{1}{4}$ " wide, nickel plated steel cases, flush handles. Graduations (guaranteed), begin at end of ring.

No. 4846. Divided feet, inches and 16ths, one side only.							
Feet	25	33	50	66	75	100	
Each	\$2 50	2 75	3 00	3 50	4 00	5 00	
4848. Divided feet, 10ths and 100ths, one side only.							
Feet	25	33	50	66	75	100	
Each	\$2 50	2 75	3 00	3 50	4 00	5 00	

STEEL MEASURING TAPES—Continued

ENGINEERS' PATTERN

With Instantaneous Readings. Steel Ribbon $\frac{1}{4}$ inch



No. 4850.

Metal lined hard leather cases, nickel plated mountings, folding flush handle, opened by pressing pin on opposite side; two detachable rings. The steel is heavier and stronger than used in the regular steel tapes, and the cases are thinner.

No. 4850. Divided feet, inches and 8ths, one side only.

Feet	33	50	66	75	100
Each	\$5 00	6 00	8 00	9 50	12 00

4852. Divided feet, 10ths and 100ths, one side only.

Feet	33	50	66	75	100
Each	\$5 00	6 00	8 00	9 50	12 00

4854. Divided Metric, one side only.

Meters	10	15	20	25	30
Each	\$5 00	6 00	8 00	10 25	12 00

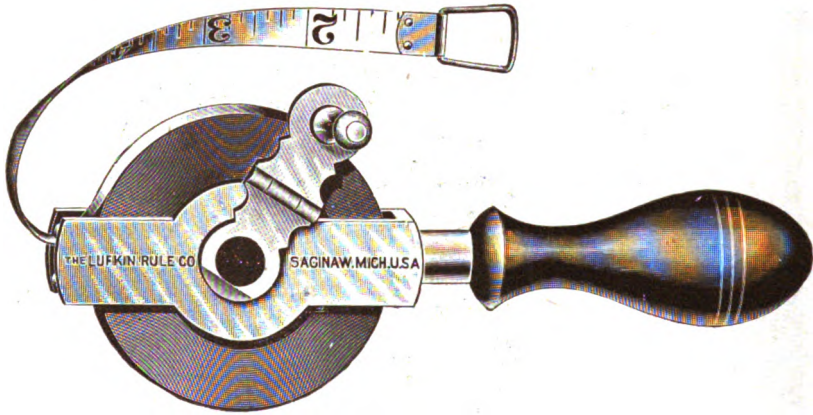
4856. Double graduations, Metric and English.

Meters	10	15	20	22	25	30
Feet	33	50	66	75	82	100
Each	\$5 65	7 00	9 30	11 00	11 90	14 00

STEEL MEASURING TAPES—Continued

GERMANIA FRAME STEEL TAPES

Folding Handles. Instantaneous Readings



No. 4860.

Nickel plated metal frames and mountings. Polished hardwood handles. Tapes very strong and serviceable.

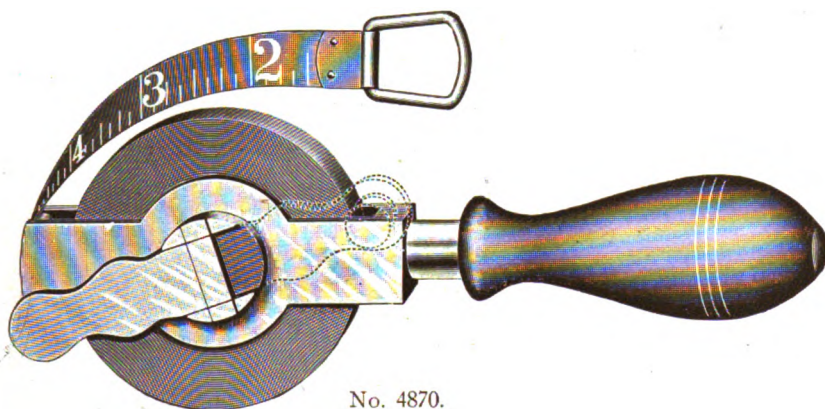
Tapes less than 150 feet long are put up on two arm frames, tapes 150 feet and over are put on four arm frames.

No. 4860. $\frac{3}{8}$ " Steel Tape, divided feet, inches and 8ths, one side only.							
Feet	25	33	50	66	75	100	
Each	\$3 00	3 50	4 00	5 25	6 25	7 75	
4862. $\frac{3}{8}$ " Steel Tape, divided feet, 10ths and 100ths, one side only.							
Feet					150	200	
Each					\$12 50	15 50	
4864. $\frac{3}{8}$ " Steel Tape, divided metric, one side only.							
Meters	10	15	20	25	30	50	
Each	\$3 50	4 50	5 25	6 75	7 75	13 00	
4866. $\frac{1}{2}$ " Steel Tape, divided feet, inches and 8ths, one side only.							
Feet				33	50	66	
Each				\$4 25	5 25	6 25	
4867. Divided feet, 10ths and 100ths, one side only.							
Feet			75	100	150	200	
Each			\$7 50	9 00	13 50	17 50	
4868. $\frac{1}{2}$ " Steel Tape, divided metric, one side only.							
Meters	10	15	20	25	30	50	
Each	\$4 25	5 25	6 25	8 00	9 00	14 50	

STEEL MEASURING TAPES—Continued

LOCK HANDLE FRAME STEEL TAPES

Instantaneous Readings



No. 4870.

Frames and trimmings of metal, nickel plated with a folding lock handle which folds over the tape, enabling user to lock at any desired lengths. The extra length of handle affords increased winding leverage. Graduations begin at end of ring. Two detachable rings.

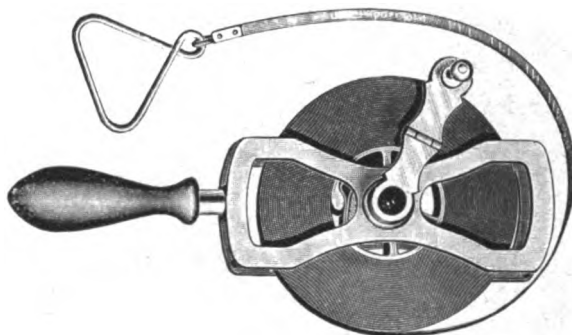
No. 4870. $\frac{1}{4}$ " Steel Tape, divided 12ths of feet.						
Feet	33	50	66	75	100	
Each	\$4 25	5 25	6 25	7 50	9 00	
4872. $\frac{1}{4}$ " Steel Tape, divided 10ths of feet.						
Each	4 25	5 25	6 25	7 50	9 00	
4874. $\frac{3}{8}$ " Steel Tape, divided 12ths of feet.						
Each	3 50	4 50	5 25	6 25	7 75	
4875. $\frac{3}{8}$ " Steel Tape, divided 10ths of feet.						
Each	3 50	4 50	5 25	6 25	7 75	
4876. $\frac{1}{2}$ " Steel Tape, divided 12ths of feet.						
Each	4 25	5 25	6 25	7 50	9 00	
4877. $\frac{1}{2}$ " Steel Tape, divided 10ths of feet.						
Each	4 25	5 25	6 25	7 50	9 00	

Tapes graduated 10ths or 12ths on one side and metric measure on other side, supplied to order.
Add 2 cents per foot to above prices.

STEEL MEASURING TAPES—Continued

SURVEYORS' CHAIN TAPES

Graduated on Babbitt Metal



No. 4880.

Specially adapted for severe usage. It is made of practically unbreakable steel, heavily coated with white metal to prevent rusting and corrosion.

Graduations are stamped on Babbitt metal at each foot end foot in tenths or twelfths as desired. End feet graduated in tenths will be furnished unless order states that twelfths are required. Tapes 150 feet and longer are put on Four Arm Metal Reels.

No. 4880. Tapes complete, $\frac{3}{16}$ " wide, with reel.

Feet	100	150	200	300	500
Each	\$6 00	8 50	9 35	11 40	18 65

4882. Tapes, only, $\frac{3}{16}$ " wide, with rings.

Each	4 00	5 50	6 35	8 40	13 65
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4884. Tapes complete, $\frac{5}{16}$ " wide, with reel.

Feet	100	150	200	300	500
Each	\$6 00	8 50	9 35	11 40	18 65

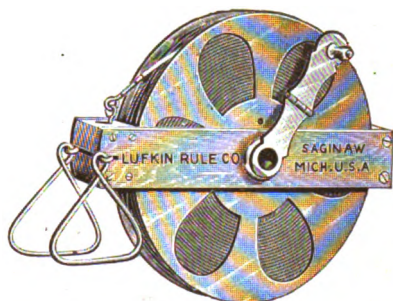
4886. Tapes only, $\frac{5}{16}$ " wide, with rings.

Each	4 00	5 50	6 35	8 40	13 65
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STEEL MEASURING TAPES—Continued

SURVEYORS' CHAIN TAPES

Etched Graduations



No. 4890.

Surveyors' Chain Tapes with heavy $\frac{1}{8}$ " steel tapes, hardwood frame with substantial sheet steel open reel. Large metal folding handle and two detachable rings. One side of frame is provided with a large and convenient leather loop for holding. Graduated one side only in feet. End feet graduated to tenths or twelfths as ordered.

No. 4890. Tapes complete, with reel.

Feet	100	150	200	300	500	650
Each	\$7 50	9 00	10 50	14 00	21 50	28 00

4892. Tapes only, with rings.

Each	4 00	5 50	7 00	10 50	18 00	24 50
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4894. Tapes complete, with reel.

Meters	25	30	50	100
Each	\$7 25	8 00	11 00	18 50

4896. Tapes only with rings.

Each	3 75	4 50	7 50	15 00
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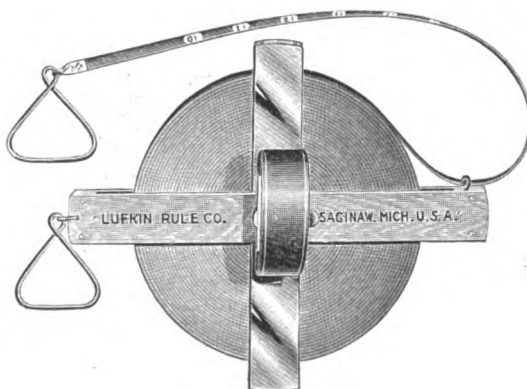
4897. Reel only.....Each \$3 50

4898. Rings only.....Per pair 50

STEEL MEASURING TAPES—Continued

SURVEYORS' CHAIN TAPES

Etched Graduations.



No. 4900.

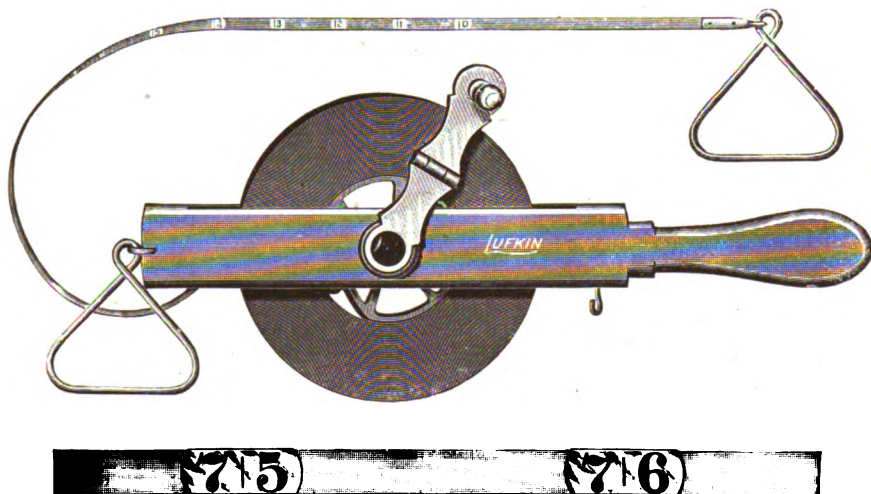
Surveyors' Tape Chain, $\frac{1}{4}$ " steel tape, as described on page 261. Reel fitted with cross arms, which keep the tape in place when winding or re-winding. When tape is in use and removed from the reel, the cross arms of the reel fold into the frame, as illustrated above, so that even the large sizes can be conveniently carried in the pocket.

No. 4900. Tapes complete, with reel.							
Feet	100	150	200	300	500	650	
Each	\$7 50	9 00	10 50	14 00	21 50	28 00	
4902. Tapes only, with rings.							
Each	4 00	5 50	7 00	10 50	18 00	24 50	
4904. Tapes complete, with reel.							
Meters			25	30	50	100	
Each			\$7 25	8 00	11 00	18 50	
4906. Tapes only, with rings.							
Each			3 75	4 50	7 00	15 00	
4908. Reel only.....							Each \$3 50
4909. Rings only.....							Per pair 50

STEEL MEASURING TAPES—Continued

SURVEYORS' CHAIN TAPES

Etched Graduations



No. 4910.

Surveyors' Chain Tapes, $\frac{1}{4}$ " wide, graduated every foot end foot in tenths, hardwood reel, with large metal folding handle, and two detachable rings. Nickel plated mountings.

The graduations are etched, and wherever graduated the steel has a bright raised surface with the figures etched in. The steel is of finest quality and tempered so that graduations will not wear off. As a convenient strong and durable chain tape cannot be excelled.

		Feet	100	150	200	300
No. 4910.	Tapes complete, with reel.....	Each	\$6 00	7 50	9 00	12 50
4912.	" only, with handles.....	"	4 00	5 50	7 00	10 50

SURVEYORS' CHAIN TAPES

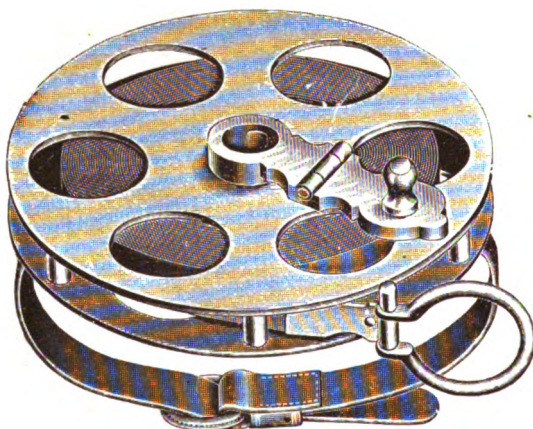
Metric Graduations One Side Only

		Metric	25	30	50	100
No. 4914.	Tapes complete, with reel.....	Each	\$5 75	6 50	9 50	17 00
4916.	" only, with handles.....	"	3 75	4 50	7 50	15 00
4917.	Reel only.....	Each				\$2 00
4918.	Ring handles.....	Per pair				50

STEEL MEASURING TAPES—Continued

"WOLVERINE" STEEL TAPES

Instantaneous Readings



No. 4920.

Open metal reel, nickel plated brass folding handle, leather strap on reverse side by which the tape can be firmly held when winding. Very strong frame.

No. 4920. $\frac{1}{4}$ " Steel Tapes, divided feet, inches and 8ths, one side only.

4922. Divided feet, 10ths and 100ths, one side only.

Feet	50	66	75	100
Each	\$7 00	8 50	9 50	12 00

4924. $\frac{1}{4}$ " Steel Tapes, divided metric, one side only.

Meters	15	20	25	30
Each	\$7 00	8 50	10 25	12 00

4926. $\frac{5}{16}$ " Steel Tapes, divided feet, inches and 8ths, one side only.

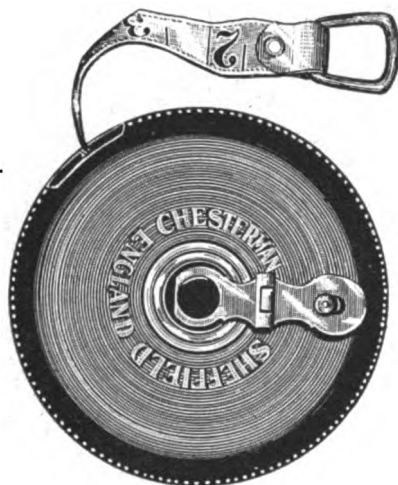
Divided feet, 10ths and 100ths, one side only.

Feet	50	66	75	100
Each	\$7 00	8 50	9 50	12 00

4928. $\frac{5}{16}$ " Steel Tapes, divided metric, one side only.

Meters	15	20	25	30
Each	\$7 00	8 50	10 25	12 00

METALLIC MEASURING TAPES CHESTERMAN'S



No. 4930.

Chesterman's Metallic Tapes, red leather case, $\frac{3}{8}$ " wide, wire woven or metallic, folding handle. Graduations begin at end of ring.

No. 4930. Divided 10ths of feet and links.

Feet	25	33	50	66	75	100
Each	\$1 80	2 10	2 60	3 00	3 30	4 20

4932. Divided 12ths of feet and links.

Feet	25	33	50	66	75	100
Each	\$1 80	2 10	2 60	3 00	3 30	4 20

Chesterman's Metallic Tapes, without case.

			Feet	25	50	66	100
No. 4934.	Divided 10ths of feet and links.....	Each	\$1 00	1 50	2 00	2 90	
4936.	" 12ths " " "	"	1 00	1 50	2 00	2 90	

METALLIC MEASURING TAPES—Continued

FLUSH HANDLE
Instantaneous Readings



No. 4940.

Lufkin Metallic Measuring Tape, $\frac{5}{8}$ " wide. Hard leather cases, double folding flush handle opened by pressing pin on opposite side. Tape made of best woven linen and metallic warp. Guaranteed to be the best metallic tape made and less liable to shrink or stretch than any other make.

Divided, one side only, in 10ths and 12ths.

No. 4940. Tapes complete, in case, 12ths.

4941. " " " 10ths.

Feet	25	33	50	66	75	100
Each	\$2 00	2 30	2 80	3 10	3 40	4 20

4942. Tapes only, without case, 12ths.

4943. " " " 10ths.

Feet	25	33	50	66	75	100
Each	\$0 80	1 00	1 40	1 60	1 80	2 60

Divided on both sides, 10ths or 12ths on one side, links on other.

No. 4944. Tapes complete, in case, 12ths and links.

4945. " " " 10ths

Feet	25	33	50	66	75	100
Each	\$2 00	2 40	2 90	3 30	3 60	4 50

Divided one side on meters and centimeters.

	Meters	10	15	20	25	30
No. 4950. Tapes complete, in case.....	Each	\$2 30	2 80	3 10	3 70	4 20
4951. " only, without case.....	"	1 00	1 40	1 60	2 10	2 60

JUNIOR METALLIC TAPES, with $\frac{3}{8}$ " steel tape, cases as described above.

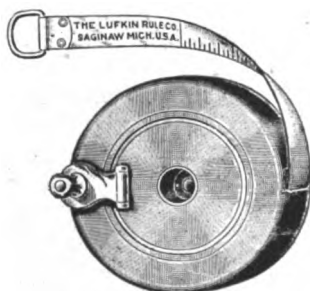
Divided feet, inches and 8ths, one side only.

	Feet	25	33	50	66
No. 4952. Tapes complete, in case.....	Each	\$1 80	2 00	2 25	2 75
4953. " only, without case.....	"	75	90	1 25	1 50

Divided feet, 10ths and 100ths, one side only.

	Feet	25	33	50	66
No. 4954. Tapes complete, in case.....	Each	\$1 80	2 00	2 25	2 75
4955. " only, without case.....	"	75	90	1 25	1 50

STEEL POCKET TAPES



No. 4960.

No. 4960. **Artisan Steel Pocket Tapes**, $\frac{3}{8}$ " wide, nickel plated cases, divided, one side only, in feet, inches and 16ths.

Feet	8	12	15	20
Each	\$1 25	\$1 50	\$1 75	\$2 00

4961. **Artisan Steel Tapes**, same as No. 4960, but divided feet, inches and 16ths, one side, millimeters on other side.

Feet	12	15
Meters	3	5
Each	\$1 80	\$2 10

4962. **Artisan Steel Tapes**, with diameter measure. These tapes are marked on one side in consecutive inches, other side with diameter graduations, enabling one by measuring the circumference to arrive at exact diameter, as fine as 64ths of inches of circular objects, such as pulleys, shafting, piping, columns, etc.

Feet	8	12	15	20
Each	\$1 50	\$1 80	\$2 10	\$2 50

4964. **Artisan Steel Tapes**, same as No. 4962, but divided millimeters on one side and diameter measure in metric on other.

Five meters long.....Each \$2 10

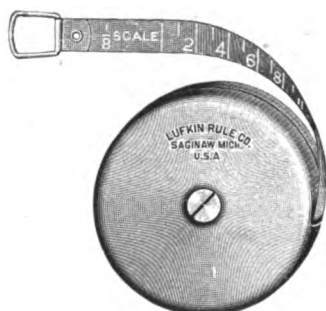
4966. **Steel Pocket Tapes**, German silver cases, spring wind with centre stop. Divided inches and 16ths one side, feet, 10ths and 100ths other side.

Feet	3	5	6	8
Each	\$0 80	\$1 13	\$1 20	\$1 70

4968. **Steel Pocket Tapes**, $\frac{1}{4}$ " wide, nickel plated cases, spring wind with centre stop. Divided inches and 16ths on one side, millimeters on other side.

Feet	3	5	6	8
Each	\$0 75	\$0 85	\$1 00	\$1 40

STEEL POCKET TAPES—Continued



No. 4970.

Steel Pocket Tapes, with Architect's scale. Round edge, nickel-plated brass cases, spring wind, with center stop. Tapes $\frac{1}{8}$ " wide, graduated inches and 16ths one side, architect's scale on other side.

No. 4970.	60" long,	$\frac{1}{8}$ " scale,	marked and numbered from 0-480....	Each,	\$0 85
4971.	" "	$\frac{1}{4}$ " "	" " " " " " " "	0-240....	" 85

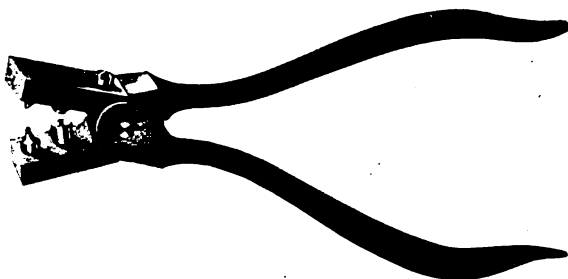
Steel Pocket Tapes, with architect's and engineer's scales, square edge, German silver cases, spring wind, center stop, $\frac{3}{8}$ " ribbon, two meters (78 $\frac{3}{4}$ "") long. Graduated one side, full length consecutive inches and 16ths bottom edge, centimeters and millimeters top edge. Other side laid out in twelve sections, graduated on both edges and containing $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, 1, 1 $\frac{1}{2}$ and 3" architect's scales with subdivisions; also engineer's scales, 10, 20, 30 and 40 parts to the inch.

No. 4972.	Each	\$3 00
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Metric Conversion Steel Pocket Tapes, German silver cases, spring wind and center stop. Graduated on one side, on bottom edge, in inches and 16ths, top edge in millimeters. Other side contains tables showing comparative values of English and Metric weights, bottom edge being marked in kilograms, top edge in pounds, both properly subdivided. So arranged that user can quickly determine the metric equivalent of an English weight or measurement and vice versa, without liability of error. Especially valuable to exporters, importers, forwarding agents, Custom House officials, etc.

No. 4974.	Two meters (78 $\frac{3}{4}$ "") long, 5/16" wide.....	Each \$2 50
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REPAIR OUTFITS FOR TAPES



No. 5000.

No. 5000. Repair Outfit, for mending steel tapes, including 1,000 eyelets.

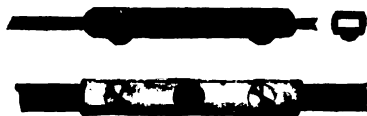
Each	\$4 00
Extra Eyelets for above, per 1,000.....	1 25

Directions: Punch a hole in the first piece of tape, leave same in position on the die; hold the second piece of tape over the first and after matching the divisions punch a hole in this second piece. Release the two pieces, insert an eyelet on the loose pin and clamp lightly, just enough to hold the two pieces together. Swing the two pieces apart and punch the second hole in the same manner, one piece at a time. Then insert second eyelet and clinch both eyelets. Although the punch will perforate two pieces of thin steel tape at once, it will be safer, and it will add to the life of the punch to proceed as described, by punching only one thickness of tape at one time. The holes can be cut near the edge of the tape, without any danger of splitting same, thus avoiding any chance of dirt collecting under the splice, or cutting the fingers when drawing the tape through the hands. Five minutes is the average time required to make a repair. They are in use in all of the principal engineering offices in the country.

SEPARATE PARTS FOR REPAIR OUTFIT No. 5000

Punching Dies	Outer Punch \$0 65	Inner Punch \$0 75
Setting "	" Die 50	" Die 50
Rubbers to release tape from punching dies.....	Each	10
Yielding Point Springs.....	"	10
New Handles	"	90
Punching Pins.....	"	25

“LITTLE GIANT” TAPE SPLICE



No. 5002.

An exceedingly useful device for making temporary repairs of broken tapes, thereby saving delay in the work. When a tape breaks, the broken ends are inserted into the splice, adjusted by the sight hole, and by turning down screws with a knife blade, tape is ready for use. Will not catch on obstructions and holds against strongest pull.

No. 5001. Little Giant Tape Splice, to fit $\frac{1}{4}$ " or $\frac{3}{16}$ " tapes.....	3 for \$1 00
Each	35
5002. Little Giant Tape Splice, to fit $\frac{1}{2}$ " tapes.....	3 for 1 00
Each	35

“EUREKA” TAPE SPLICE

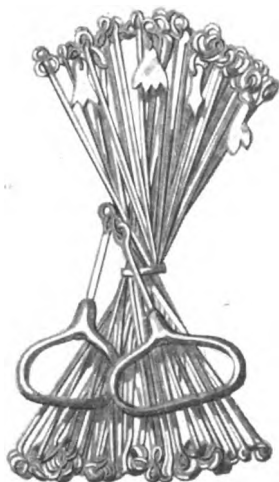
Consists of thin sheet metal folded in the shape of a sleeve and coated with a combination of solder and flux so sensitive that it will make a perfect adhesion with the tape by simply heating with a lighted match.

A neat and durable repair can be made in the field in a minute or less. Put up in small round wooden boxes with screw cover. Made in all widths to match the standard steel tapes. Directions, with each box.

No. 5004. Eureka Tape Splice.....	Per box of 1 doz. \$0 50
	“ “ “ $\frac{1}{2}$ “ 30

In ordering, please state width of Tape for which Splices are wanted.

MEASURING CHAINS



No. 5010.

Of Steel, U. S. Standard.

									Each
No. 5010.	Steel,	33 feet,	W. G. 12,	brazed links and rings,	brass handles				\$5 50
5010A.	"	50 "	" 12,	" " " " " "	" "				6 00
5010B.	"	66 "	" 12,	" " " " " "	" "				10 00
5010C.	"	100 "	" 12,	" " " " " "	" "				11 00
5010D.	"	33 "	" 12,	oval rings,	brass handles.....				3 50
5010E.	"	50 "	" 12,	" " " " " "	" "				4 50
5010F.	"	66 "	" 12,	" " " " " "	" "				6 50
5010G.	"	100 "	" 12,	" " " " " "	" "				8 00

Of Steel, Meter and Vara.

									Each
No. 5012.	Steel,	10 meter,	W. G. 12,	brazed links and rings,	brass handles				\$5 50
5012A.	"	15 "	" 12,	" " " " " "	" "				7 50
5012B.	"	20 "	" 12,	" " " " " "	" "				10 00
5012C.	"	25 "	" 12,	" " " " " "	" "				12 50
5012D.	"	10 "	" 12,	oval rings,	brass handles.....				3 50
5012E.	"	15 "	" 12,	" " " " " "	" "				5 00
5012F.	"	20 "	" 12,	" " " " " "	" "				6 20
5012G.	"	10 varas,	" 12,	brazed links and rings,	brass handles				5 50
5012H.	"	20 "	" 12,	" " " " " "	" "				10 00
5012J.	"	10 "	" 12,	oval rings,	brass handles.....				3 50
5012K.	"	20 "	" 12,	" " " " " "	" "				6 50

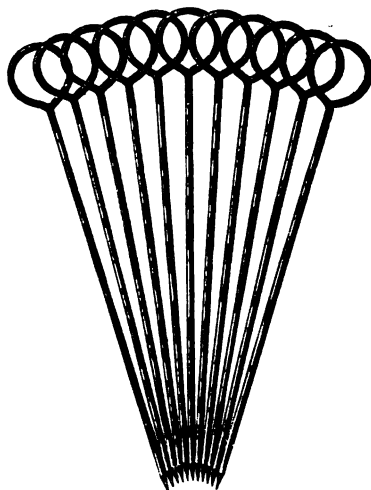
Of Iron, U. S. Standard.

									Each
No. 5014.	Iron,	50 feet,	W. G. 8,	oval rings,	brass handles.....				\$3 50
	"	100 "	" 8,	" " " " " "	" "				5 50

ARROWS



No. 5020.



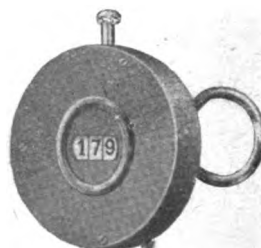
No. 5024.

No. 5020.	3/16" square, 14" long, nickel-plated, fitted with red flag. Per set of 11.....	\$2 50
5022.	3/16" round, 10" long, nickel-plated.....Per set of 11	1 30
5024.	3/16" " 14" " " " " " " " " " " " "	1 50
5026.	9/64" " 10" plain	" " " " 80
5028.	9/64" " 14" "	" " " " 90

TALLYING MACHINES



No. 5030.



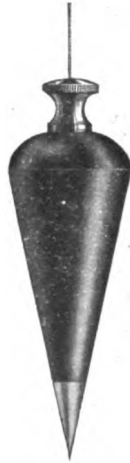
No. 5038.

No. 5030.	Tally	Register,	nickel	case, 2"	registers	on 2	dials to	99,	Each	\$2 00
5034.	"	"	"	" 2"	"	" 3	" " 999,	"	2 50	
5038.	"	"	"	" 2"	"	" 3 *	" 9999,	"	3 50	

PLUMB BOBS



No. 5050.



No. 5055.



No. 5070.

No. 5050. Fine Brass Plumb Bobs, long necks, hardened steel points and screw caps.

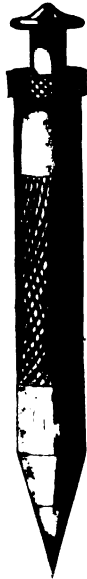
No. 5050A.	4 ounces.....	Each	\$1 25
5050B.	6 ".....	"	1 50
5050C.	8 ".....	"	1 75
5050D.	12 ".....	"	2 00
5050E.	14 ".....	"	2 25
5050F.	16 ".....	"	2 50
5050G.	18 ".....	"	2 75
5050H.	24 ".....	"	3 25
5050J.	32 ".....	"	3 75
5050K.	48 ".....	"	5 00

No. 5055. Fine Brass Plumb Bobs, short necks, hardened steel points and screw caps.

No. 5055A.	4 ounces.....	Each	\$1 25
5055B.	6 ".....	"	1 50
5055C.	8 ".....	"	1 75
5055D.	12 ".....	"	2 00
5055E.	14 ".....	"	2 25
5055F.	16 ".....	"	2 50
5055G.	18 ".....	"	2 75
5055H.	24 ".....	"	3 25
5055J.	32 ".....	"	3 75
5055K.	48 ".....	"	5 00

No. 5070. Miners' Plummert Lamp, 6½" (weight about 20 oz.), made of brass with steel point; hung in gimbals with chains for suspending. Upper part is hollow and provided with an arc burner serving as a lamp. Sight is taken to the center of flame.....Each, \$10 00

PLUMB BOBS—Continued



No. 5080.



No. 5110.

(See following page)

No. 5080.	Mercury	Plumb	Bob,	3½ oz.,	4" long,	⅝" diameter.....	Each	\$1 00
5082.	"	"	"	6 "	4½"	" ⅝"	"	1 50
5084.	"	"	"	12 "	5½"	" ⅝"	"	2 00
5086.	"	"	"	16 "	6"	" 1"	"	2 50

PLUMB BOB CORD

No. 5090.	Plumb	Bob	Cord,	best	braided	linen,	medium	or	thick...	Yard	\$0 02
5092.	"	"	"	"	"	sack.....	"				06

SHEATHS FOR PLUMB BOBS

No. 5100.	Sewed	Leather	Sheath,	with	belt	loop	for	Plumb	Bobs.		
	6	to	8	ounces.....						Each	\$0 35
5102.	12	"	14	"						"	45
5104.	18	"	24	"						"	55
5106.	32	"	48	"						"	75

STAKE TACKS

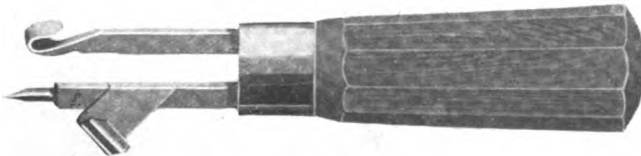
No. 5110. Galvanized Stake Tacks, $\frac{3}{4}$ " long, with depression in head for setting plumb bob or lining pole quickly and accurately.

2 ounce box.....	\$0 15
3 pound "	1 25

TIMBER SCRIBES



No. 5120.



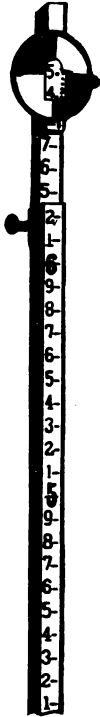
No. 5122.

No. 5120.	Timber Scribe or Marker, small 5".....	Each \$1 00
5122.	" " " " large 6 $\frac{1}{2}$ ".....	" 1 25

LEVELING RODS



No. 5180.



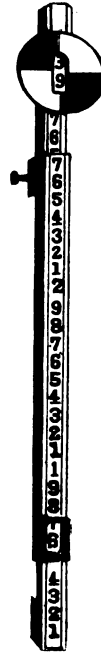
No. 5184.



No. 5188.



No. 5190.



No. 5192.



No. 5196.

LEVELING RODS

No. 5180.	Heavy Philadelphia Rod, with Vernier Clamp and Target, 7 feet long, sliding out to 13 feet, plain.....	Each \$15 00
5182.	Heavy Philadelphia Rod, same as No. 5180, subdivided 100 parts to the foot.....	" 15 00
5184.	Light Philadelphia Rod, with Vernier Clamp and Target, 6½ feet long, sliding out to 12 feet, plain.....	" 13 00
5186.	Light Philadelphia Rod, same as No. 5180, subdivided 100 parts to the foot.....	" 13 00
5188.	New York Rod, divided 10ths and 100ths parts to the foot, with Vernier Clamp and Target, 6½ feet long, sliding out to 12 feet.....	" 14 00
5190.	Boston Rod, with Vernier at both ends, 6½ feet long, sliding out to 11 feet 4 inches.....	" 14 00
5192.	Mining Rod, with Vernier Clamp and Target, 3 feet long, sliding out to 5 feet.....	" 11 40
5194.	Mining Rod, same as No. 5192, 5 feet long, sliding out to 9 feet.....	" 12 00
5196.	Architects' Rod, 5½ feet long, brass mounted, with Clamp and Target, sliding out to 10 feet 6 inches, divided to 1" and ¼".....	" 6 00
5198.	Architects' Rod ¹ , same as No. 5196, divided 10ths and 100ths parts to foot.....	" 6 00

STADIA RODS AND RANGING POLES



No. 5200.



No. 5202.



No. 5210.



No. 5214.

STADIA RODS AND RANGING POLES—Continued

- No. 5200. Stadia Rod, self-reading, folding with strong brass hinge, 6 feet closed, opening to 12 feet, 2 fold.....Each, \$12 00
5202. Cross Section Rod, 10 feet, divided into feet, 10ths and 100ths on both sides, level bubble at each end and opening for the hand..... " 10 00

RANGING POLES

5210. Ranging Poles of best seasoned wood, octagonal tapered, painted red and white alternately.
- | | | | | |
|------------|--------|--------|--------|--------|
| Feet | 5 | 6 | 8 | 10 |
| Each | \$1 75 | \$2 00 | \$2 25 | \$2 50 |
5212. Ranging Poles of best seasoned wood, round tapered, painted red and white alternately.
- | | | | | |
|------------|--------|--------|--------|--------|
| Feet | 5 | 6 | 8 | 10 |
| Each | \$1 75 | \$2 00 | \$2 25 | \$2 50 |
5214. Tubular Iron Ranging Poles, painted red and white alternately.
- | | | | |
|------------|--------|--------|--------|
| Feet | 6 | 8 | 10 |
| Each | \$2 75 | \$3 00 | \$3 50 |
5216. Octagonal Steel $\frac{1}{2}$ " Ranging Poles, painted red and white alternately.
- | | | | |
|------------|--------|--------|--------|
| Feet | 6 | 8 | 10 |
| Each | \$2 75 | \$3 00 | \$3 50 |

FLEXIBLE POCKET LEVELING RODS

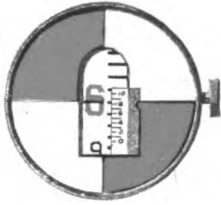


No. 5230.

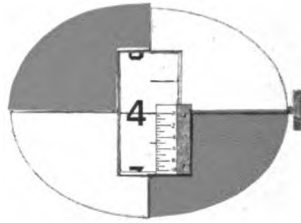
- No. 5230. Flexible Pocket Leveling Rod, 10 feet long, divided into 10ths and 100ths.....Each \$3 25
5232. Flexible Pocket Leveling Rod, like No. 5230, but 12 feet long " 4 00
5234. Flexible Pocket Leveling Rod, 12 feet long, divided into inches and $\frac{1}{2}$ inches..... " 4 00
5236. Flexible Pocket Leveling Rod, 3 $\frac{1}{2}$ meters long, divided into centimeters..... " 4 00

These Rods are made of pliable, strong, rubber canvas, divided like self-reading rods. Can be coiled up and carried in the pocket. For use, they are fastened to a board or stick with thumb tacks.

SEPARATE TARGETS FOR LEVELING RODS



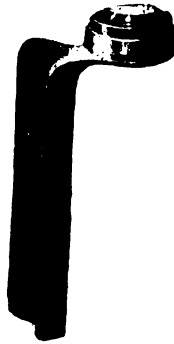
No. 5240.



No. 5242.

No. 5240.	Round Target, for heavy Philadelphia Rods.....	\$5 00
5242.	Oval " " " "	5 50
5244.	Round " " New York Rods.....	5 00

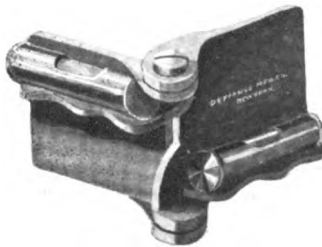
ROD LEVELS



No. 5250.

No. 5250.	Rod Level, round level vial, 1".....	\$3 00
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This Rod Level is used to determine that the rod is held perpendicular. By the long rectangular plate, proper contact is secured when holding to the rod, but it may be attached to the rod by means of a flat-head screw, for which there is a keyhole slot in the plate.



No. 5252.

No. 5252. Rod Level, for plumbing rod.....	\$3 00
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MAGNETIC POCKET COMPASS



No. 5260.

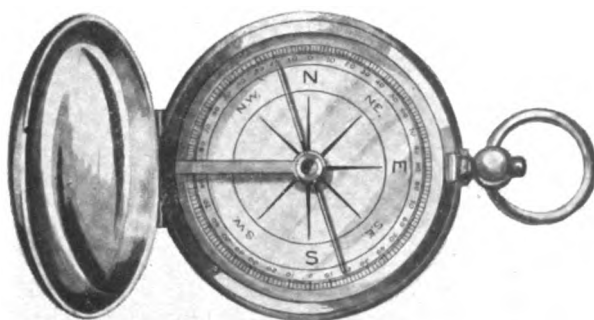


No. 5262.



No. 5264

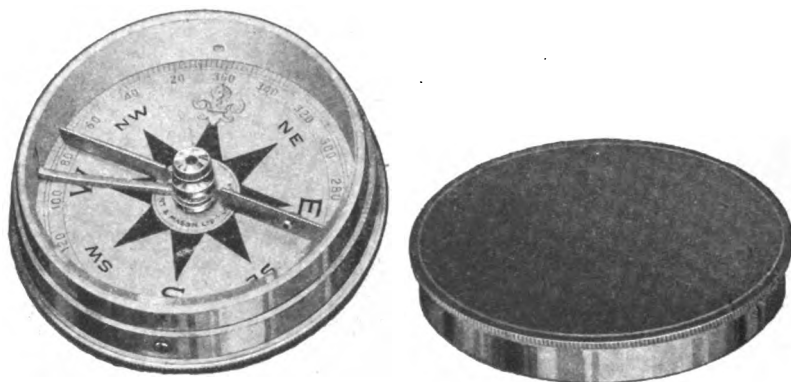
No. 5260.	Pocket Compass, brass, watch pattern, paper dial.....	Each,	1 1/8" \$0 20	1 1/2" \$0 25	1 3/4" \$0 30
5262.	Pocket Compass, brass, watch pattern, metal dial.....	"	1 1/8" \$0 40	1 1/2" \$0 45	2" \$0 50
5264.	Pocket Compass, brass, watch pattern, metal dial, stop to needle.....	"	1 1/8" \$0 50	1 1/2" \$0 55	2" \$0 60



No. 5266.

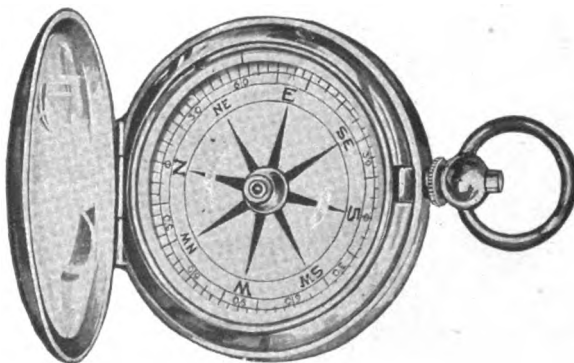
No. 5266.	Pocket Compass, nickel-plated hunting case, edge bar needle, jewel cap and self-acting stop, Each,	1 1/2" \$2 65	1 3/4" \$3 00
5268.	Same as No. 5266, but with untarnishable etched silver metal dial.....	" 3 00	3 25

MAGNETIC POCKET COMPASSES—Continued



No. 5270.

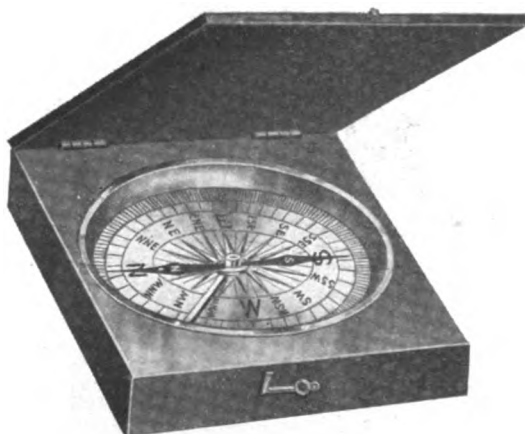
No. 5270.	Pocket Compass, enameled card dial edge, bar needle, jewel cap and stop, beveled glass.....	1½"	2"	2½"	Each, \$1 50	\$2 00	\$2 25
5272.	Same as No. 5270, but with untarnish- able silvered metal dial.....	"	2 00	2 25	2 50		



No. 5278.

No. 5278	Pocket Compass, untarnishable, aluminum float- ing dial, jewel cap and self-acting stop.....	1½"	1¾"	Each, \$3 50	\$4 00
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MAGNETIC POCKET COMPASSES—Continued



No. 5280.

- | | | |
|-----------|--|--------------|
| No. 5280. | Mahogany Case, 3×3", card dial, 2" needle with stop, full circle division..... | Each, \$1 25 |
| 5281. | Mahogany Case, 3×3", metal dial, 2" bar needle with stop, jeweled, full circle division..... | " 2 40 |



No. 5282.

- | | | |
|-----------|--|--------------|
| No. 5282. | Mahogany Case, enameled card dial, best tempered edge bar needle, 1½", with jewel cap and stop..... | Each, \$2 15 |
| 5283. | Same as No. 5282, but with 2" needle..... | " 2 35 |
| 5284. | Mahogany Case, silvered metal dial, best tempered edge bar needle, 1½", with jewel cap and stop..... | " 2 50 |
| 5285. | Same as No. 5284, but with 2" needle..... | " 2 75 |

MAGNETIC POCKET COMPASSES—Continued



No. 5286.

- No. 5286. Military Compass, 3×3", bar needle about 2½", with agate center and automatic stop, graduated on raised metal ring to degrees. Polished mahogany box with sighting line on inside of cover.....Each, \$4 00



No. 5287.

5287. Military Night Marching Compass, bronzed hunting case with graduated aluminum dial, luminous center with sighting line on lid..... " 10 57

MAGNETIC POCKET COMPASSES—Continued

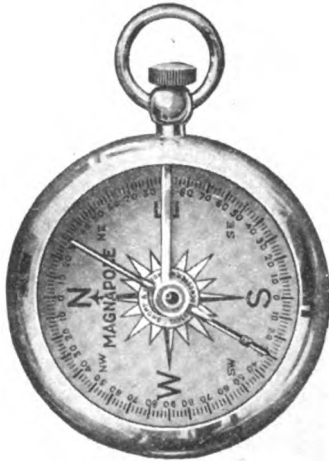


No. 5289.

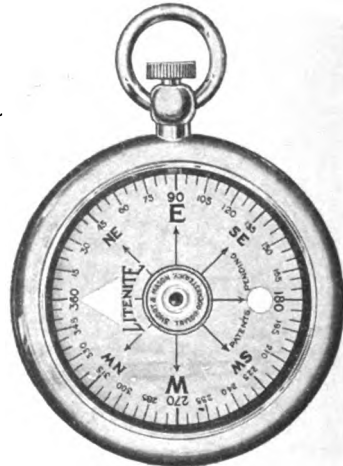
No. 5288. **Pocket Compass**, heavy gauge bronze metal case, hinged lid, untarnishable etched silvered metal dial, edge $1\frac{1}{2}$ " 2" bar needle.....Each, \$4 50 \$6 00

No. 5289. **Pocket Compass**, heavy gauge bronzed case, hinged lid, floating aluminum dial, with luminous points N. & S., $1\frac{1}{2}$ " 2" and luminous line in lid of case.....Each, \$6 25 \$7 75

MAGNETIC POCKET COMPASSES—Continued



No. 5292.



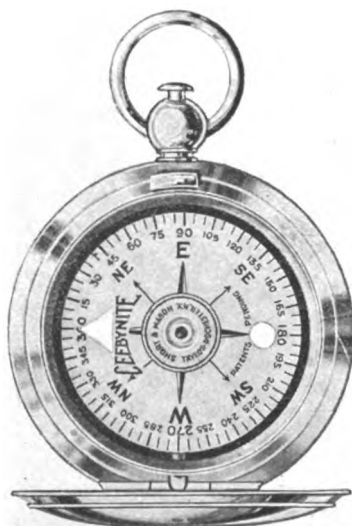
No. 5296.

- No. 5290. **The Leedawl Compass**, metal case, silvered metal dial..Each, \$1 00
5292. **The Magnapole Compass**, metal case, white enamel dial, jeweled centre, improved needle lifting device.... “ 1 50
5294. **The Flordial Compass**, metal case, dust and moisture proof floating dial, jeweled centre and stop arrangement “ 1 50
5296. **The Litenite Compass**, metal case, floating dial, jeweled center and stop arrangement. North and South points prepared with luminous compound making same visible at night..... “ 2 00

MAGNETIC POCKET COMPASSES—Continued



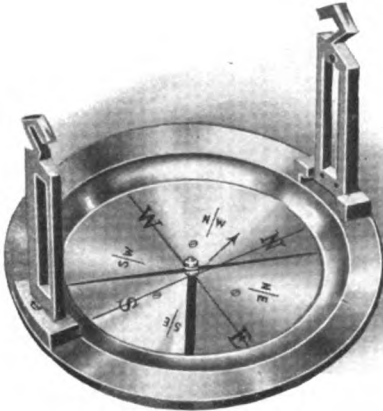
No. 5300.



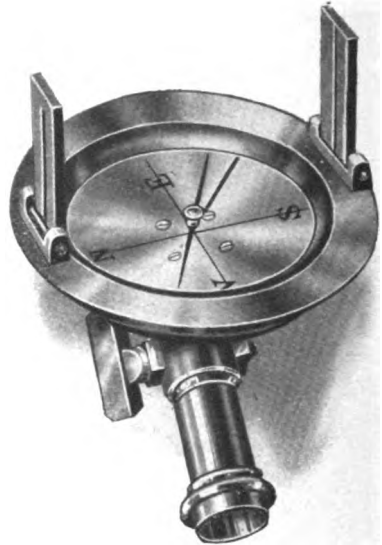
No. 5304.

- No. 5300. **The Aurapole Compass**, metal hunter case, aluminum dial, jeweled centre.....Each, \$2 50
5302. **The Meradial Compass**, metal hunter case, floating dial, jeweled centre and stop arrangement..... “ 2 50
5304. **The Ceebynite Compass**, like No. 5296, but with hunter case “ 3 00


SURVEYING COMPASSES



No. 5320.



No. 5326.

- | | | |
|--|--|--|
|  | <p>No. 5320. Surveying Compass, with folding sights, ending in hooks, graduated to 1°, needle 2", in mahogany case... Each, \$6 00</p> <p>No. 5322. Same as No. 5320, needle 2½", in mahogany case..... " 7 00</p> <p>5324. Same as No. 5320, needle 2½", in mahogany case..... " 8 00</p> <p>5326. Surveying Compass, with folding sights, graduated to 1°, with ball joint and socket for Jacob-staff mounting, needle 2½", in mahogany case..... " 10 00</p> <p>5328. Surveying Compass, with folding sights ending in hooks, silvered compass box, graduated on raised ring to degrees, needle 3½" with ruby center and stop, ball and socket joint, in mahogany case..... " 12 00</p> <p>5330. Surveying Compass, with folding sights graduated to 1°, with two bubbles, ball joint and socket for Jacob-staff mounting, needle 2½", in mahogany case..... " 13 50</p> <p>5332. Same as No. 5330, needle 3½", in mahogany case..... " 14 50</p> <p>5334. Same as No. 5330, needle 4½", in mahogany case..... " 16 00</p> <p>No. 5336. Jacob-staff, 5 feet, iron shoe..... Each, \$1 00</p> <p>5338. Tripod, with Jacob-staff top for compass, light..... " 3 00</p> | |
|--|--|--|

No. 5338.

SURVEYING AND SIGHT COMPASSES



No. 5340.

No. 5340. **Vernier Compass**, 4" needle, two straight levels, Jacob-staff mountings, brass cover, out-keeper, vernier for adding or subtracting the magnetic variation of the needle sights graduated for taking angles of elevation and depression, in mahogany box with lock and strap for carrying.....Each, \$35 00

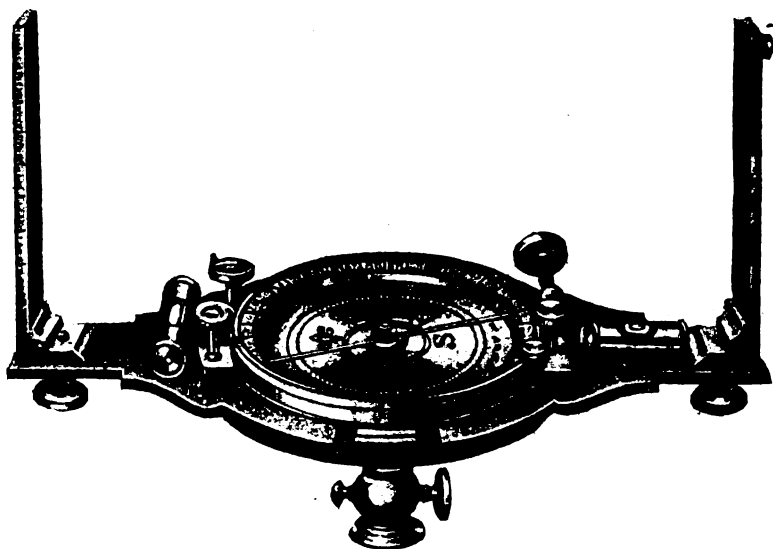
5342. **Vernier Compass**, same as above, but with 5" needle... " 40 00

5344. **Vernier Compass**, same as above, but with 6" needle... " 45 00

The Railroad Compass has the main plate levels, sights and needle, Jacob-staff mountings, brass cover, out-keeper and vernier for setting off the variations of the needle of the ordinary Surveyors' Compass, but has also underneath the main plate a divided circle or limb, by which horizontal angles to single minutes can be read independently of the needle.

(See following page)

SURVEYING AND SIGHT COMPASSES—Continued

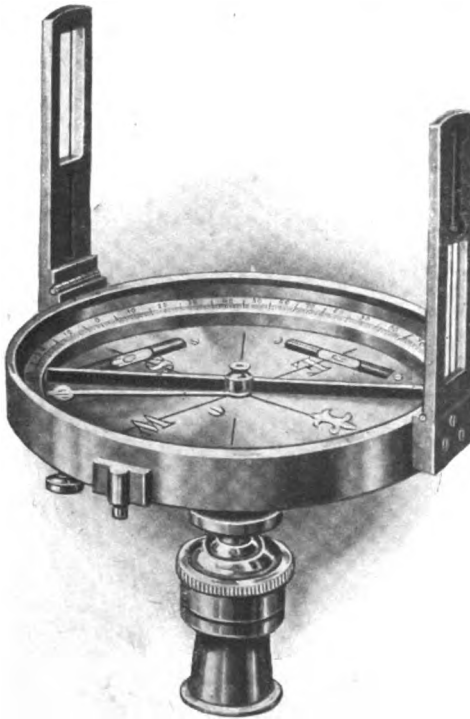


No. 5346.

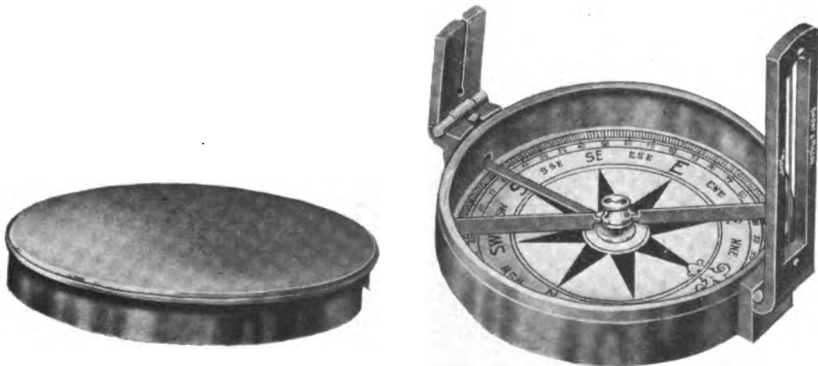
No. 5346.	Railroad Compass, in mahogany box with lock and strap, 5½" needle, one vernier to limb.....	Each, \$65 00
5348.	Railroad Compass, with 5" needle and two verniers to limb.....	" 75 00
5350.	Railroad Compass, with 5½" needle and two verniers to limb.....	" 80 00
5352.	Tripod for Railroad Compasses No. 5346-5350.....	" 6 00

SURVEYING AND SIGHT COMPASSES—Continued

No. 5360. Surveying Compass, with folding sights on revolving ring with vernier and scale for magnetic variations, $4\frac{1}{2}$ ", jeweled bar needle, ball and socket mounting (Jacob-staff), complete in mahogany case. Each..... \$29 00



No. 5360.

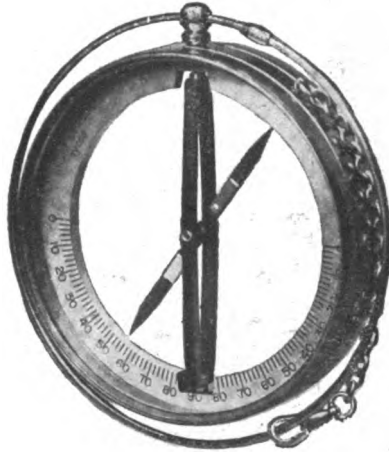


No. 5362.

No. 5362. Sight Compass, bronzed metal case with cover silvered, metal dial, tempered edge bar, jewel cap, automatic stop.

Diameter	2"	2½"	3"
Each	\$6 00	\$7 20	\$8 75

DIP NEEDLES

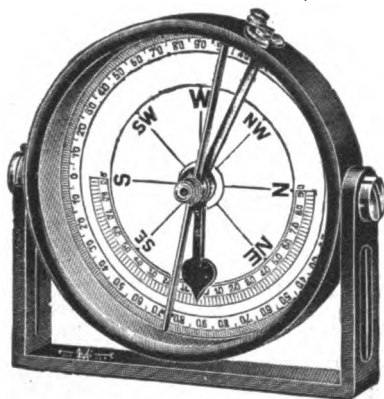


No. 5382.

No. 5380. Miners' Compass, for bracing iron ore, with 3" dip needle mounted in brass ring, graduated 0° to 90° in each direction, and having plate glass top and bottom. When used for bracing ore, the observer should hold the ring in his hand and keep the needle North and South, standing with his face to the West. The inclination of the needle as read off the graduated scale will show the dip. If the compass is held horizontal, it serves as an ordinary compass.....Each, \$12 00

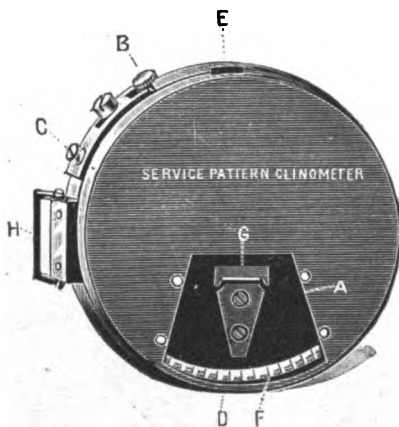
5382. Same as No. 5380, but Norwegian pattern, needles suspended in gimbals.....Each, 14 00

SIGHT COMPASS AND CLINOMETER



No. 5390.

- No. 5390. Bronzed Sight Compass and Clinometer, silvered metal dial, edge bar needle and stop. The sights are made in form of a bridge, to be turned on their pivots at right angles. The bridge can be used to form a base, by which means angles of inclination in inches per yard and in degrees can be observed. Diameter, 3", in leather case.....Each, \$8 75



No. 5400.

- No. 5400. Military Clinometer, bronzed case, 3", for measuring angles of elevation or depression, ivory arc scale held clamped, which is released by pressing on knob enabling arc to swing freely. The scale on arc graduation 0° to 45° in each direction; the red scale denoting elevation, the black scale depression. In leather sling case.....Each, \$19 50

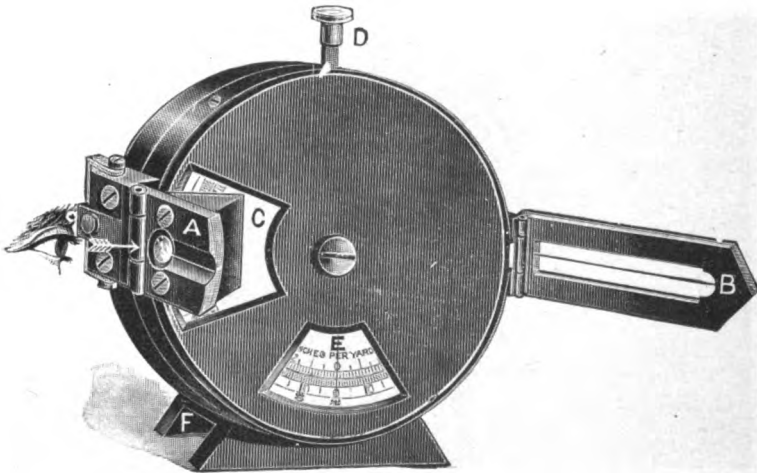
PRISMATIC COMPASSES

No. 5420. Prismatic Compass, 2", bronzed case, floating card dial, jeweled center, in morocco case. Each, \$11.00.

No. 5424. Same as No. 5420, but 3", in leather sling case. Each, \$16.00.



No. 5420.



No. 5430.

No. 5430. Combined Prismatic Compass and Altimeter, 3", bronzed case, with floating card compass dial, jeweled center, clinometer scale, graduated 0° to 180° with scale of rise and fall of inches per yard, folding prism and metal sight, in leather sling case.....Each, \$27 00

DEFIANCE ENGINEERING AND SURVEYING INSTRUMENTS

In presenting the following description of Defiance Transits, Levels and Engineering Instruments, we wish to call our patrons' attention to the fact that no care and expense have been spared in producing instruments that are of a particularly high grade character.

We have equipped our factory with the most modern improved machinery, and employ only experts in the production of our instruments.

A close study of the following details of construction will convince the prospective purchaser of the desirability of selecting a Defiance Transit or Level.

CENTRES

All Defiance Transits are of the compound socket type.

The metals used in the centres of our transit instruments are phosphor bronze, gun-metal and bell-metal.

Experience has proven this combination to give the best results, owing to their longevity, smoothness and evenness of motion with absolutely no danger of fretting or cutting.

All centres have long tapers with broad flanges. They are absolutely concentric with each other, being turned in "dead centre" lathes, and each very carefully fitted, tested and verified.

TELESCOPES

Defiance instruments are provided with improved and powerful telescopes and with our perfect achromatic lense system give increased illumination and clearness. Erecting eyepiece giving large, clear, flat field of view (inverting eyepiece optional without extra charge). *High power lenses without loss of light. We have found that a power of from 20 to 25 diameters in the telescopes of Transits and about 30 diameters in telescopes of Wye Levels give the best results.

Telescopes are balanced and will reverse at either end.

Object glass has large aperture and is focused by means of rack and pinion placed on the side of telescope, unless otherwise ordered.

The cross wires are brought into focus by simply rotating the eyepiece to right or left.

The variable power eyepiece may be furnished on special order, however, we cannot recommend it. It has many disadvantages. It is cumbersome, complicated and inaccessible, adding extra weight to the eyepiece, besides making it compulsory that the focal length of the telescope be shortened, thereby decreasing its power, or that the height of the standards be increased, which is not desirable.

* Owing to the amount of light gained with an inverting eyepiece, objects will appear much more brilliant than in a telescope of the same power and focal strength with erecting eyepiece.

Careful consideration is given Defiance Telescopes to equip them with a lens system in strict keeping with their corresponding refinements, which makes possible a degree of accuracy not attained with a changeable power eyepiece.

The object slide is absolutely parallel to the line of collimation for all distances, and in our method of construction this slide travels in bearings of anti-friction metal, thus avoiding the cutting so common in almost all instruments where the two tubes come in direct contact.

With our improved pinion and anti-friction bearing slide, smoothness of motion and permanency of adjustment is insured.

All telescopes are provided with protection or dust shade to object glass slide without extra charge.

Transit telescopes have a centre in top for exact setting of the instrument from a point overhead.

A detachable top or a detachable slide telescope for vertical sighting is furnished at an extra cost of \$25.00.

The Telescopic Solar as described on page 331 may also be used for vertical sighting.

COMPASS

The compass of our instruments is graduated to half-degrees on its upper surface and is figured from 0° - 90° each side of N. and S. **The whole compass box is completely silvered.**

Needles are made of superior steel hardened, and have jewel bearing on tempered steel point. A coil of fine wire is wound on the south end of the needle and may be moved back or forth in order to counter-poise the varying weight. Needles are correctly balanced for our latitude and must be rebalanced if instrument is to be used north or south of this latitude. They are, however, all balanced at our factory in consideration of the latitude wherein they are to be used.

VARIATION PLATE

This attachment is regularly supplied with our Light Mountain and Mining Transit and Reconnaissance Transit without extra charge.

The accurate setting off of the variation is determined by a graduated arc on the bottom plate of compass box in conjunction with a vernier reading to minutes on compass ring.

Additional for variation arc to compass, \$4.50.

GRADIENTER SCREW

This attachment is often used with transits for determining distances, establishing grades and measuring vertical angles.

This screw is substituted in place of the regular tangent screw to telescope axis. It is accurately cut and of such a number of threads that two revolutions will equal one foot to one hundred feet, or, in other words, two complete revolutions of the screw will move the horizontal wire of the telescope over a space of one foot on a vertical rod at a distance of one hundred feet.

The graduated disc is divided into 50 equal parts. It is movable, so that all readings may be started at zero.

A silver scale graduated to the pitch of the screw swings down to edge of disc, so that by comparing the edge of disc with the graduations of the scale the number of complete revolutions may be easily determined. When not in use the scale may be swung back out of the way and the screw used as an ordinary tangent screw.

This attachment may be added to any of our transits at an extra cost of \$10.00.

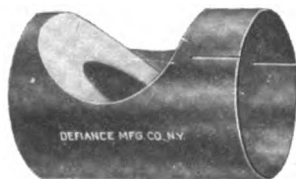
TO ESTABLISH GRADES

Level the instrument, bringing the telescope level to the centre of its tube by means of the gradienter screw; holding the screw with one hand turn the graduated disc until its zero is brought to the edge of the scale; turn off as many spaces on the screw as there are hundredths of feet to the hundred in the grade.

PROTECTION TO OBJECT SLIDE

A rain or dust guard for the object slide is furnished with all telescopes without extra charge.

ILLUMINATION OF THE CROSS WIRES



For the purpose of illuminating the cross wires in mining work, and observations on Polaris, we make a reflecting shade in all sizes to attach to object end of telescope. Price of this reflector, \$4.00.

LATITUDE LEVEL

The latitude having been set off for the day on the vertical arc, may be recovered without referring to the arc by use of the Latitude Level which is clamped to the end of the telescope axis.

Price of this attachment, \$12.00.

The Latitude Level is also useful for setting the telescope at any desired angle in running grades.

DOUBLE VERNIER VERTICAL CIRCLE

We also make a $4\frac{1}{2}$ inch vertical circle which is enclosed in an aluminum guard or frame. This guard carries two double opposite verniers and serves as a protection to the circle. Capstan head screws are provided for adjusting the verniers.

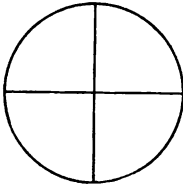
Price of circle, with Solid Silver Graduations reading to single minutes, \$35.00.

This attachment can be added to new instruments only at this price.

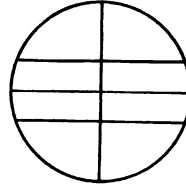
For Theodolites reversible over standard bearings, the attachment is provided with a reversible tangent.

Price, \$40 00.

THE STADIA



No. 5450.



No. 5452.

We have constructed a mechanical apparatus whereby we are enabled to place fixed stadia wires on the diaphragms of our telescopes that they will read 1-100 accurately on any leveling rod.

It is conceded generally that the fixed stadia is far superior and more reliable than the adjustable form, since the latter is so liable to derangement.

The **constant which is to be added** to all stadia measurements is noted on a card placed inside of each box.

It is the distance from the centre of the instrument to a point in front of the objective equal to its focal length.

Occasionally we have been requested to set Stadia wires to read from the centre of the instrument. This is a practice to be avoided.

Price of fixed stadia wires in any telescope.....	\$7 00
Disappearing stadia	10 00
Adjustable stadia	5 00

Stadia wires are furnished without extra charge, if ordered with new instruments. All instruments will be furnished with plain wires, unless ordered otherwise.

Cross wires replaced on old ring.....	\$2 00
Adjustable stadia, old ring.....	3 00
Fixed stadia, old ring.....	5 00

LEVELING, CLAMP AND TANGENT SCREWS

These screws are made of Bell Metal and the angle and pitch of the threads are such as to give the greatest possible wear. All tangent screws are provided with improved opposing spring. Upon the spherical end of the leveling screws a shoe is securely fastened so as to prevent its loss when manipulating the screws. All screws are of standard size and thread. They may be replaced at any time in case of loss or injury.

QUICK LEVELING ATTACHMENT

We can apply this to our Mountain and Mining Transits, Explorers' Transits, and leveling instruments at an extra cost of \$8.00. It adds about one pound to the weight.

THREE LEVELING SCREWS

The three leveling screw base offers much more rigidity than four, although adding considerably to the weight of the instrument.

All instruments having the larger horizontal circles (larger than 6 $\frac{3}{4}$ inches), should be provided with three leveling screws.

The three leveling screw base is considerably larger than the four, hence, is not as portable. It offers an opportunity for closer work, although with less rapidity of operation.

Defiance Transits with three leveling screws are also provided with a shifting centre which, in reality, is part of the tripod.

This device consists of a triangular plate with radial grooves in which the leveling screws rest and which is movable on the top of the tripod head. After sliding this plate, carrying the instrument, until the plumb-bob is brought over the desired point, the plate is securely locked by a large lock-nut with a broad flange having projecting arms.

A hollow shaft having a knurled head, screws onto the instrument and a knurled nut on shaft with the aid of a spiral spring secures the instrument to the tripod.

It is necessary to release both the lock-nut and the tension on the spiral spring to operate the shifting centre.

Instruments with three leveling screws will be made to order only at an extra cost of \$15.00.

SHIFTING CENTRES

We have adopted for all our transits the shifting centre, by which, after an approximate setting of the tripod, the transit may be brought immediately over a point on the ground or under a point from above.

FINISH

Our instruments are all regularly finished in bronze, which is the hand-some dark polished finish suitable for all classes of work.

The standards have a finish which resemble a cloth covering.

Customers desiring a finish other than the ones just described will kindly specify when ordering.

GRADUATIONS

Solid Silver Graduations throughout are regularly furnished in all Defiance Transits. **No extra charge is made for this valuable and most satisfactory refinement.**

Solid Silver presents a smooth, even surface, and in fact is the only surface suited for fine, accurate graduations.

With our automatic dividing engines of superior mechanical design and construction, and a Solid Silver surface to cut, we are enabled to produce graduations of **absolute equal spacing, absolute uniform width of line, absolute correct and accurate reading of opposite verniers.**

All horizontal limbs except those of Transits Nos. 6650 to 6652 are regularly figured from 0° - 360° and 0° - 90° each way, unless otherwise ordered. See figure 1, page 299.

Verniers are placed 30° to line of sight (unless they are especially ordered otherwise) which facilitates the reading of horizontal angles while operator is in the same relative position as when sighting through the telescope.

Verniers are covered with crystal glass and provided with shades which illuminate them.

Our instruments are graduated to read to 10 seconds, 20 seconds, 30 seconds, and single minutes. Centesimal or French system graduations and decimal graduations are made to order only.

Solid Silver Graduations with double opposite verniers reading to minutes and figured as Style 1, page 299, will be furnished at the prices named in this catalog when style graduation is not specified.

HORIZONTAL CIRCLE GRADUATIONS

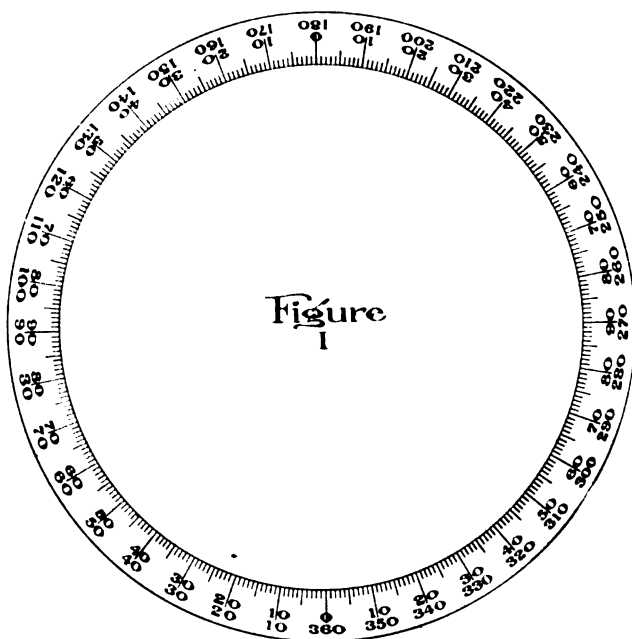


Figure I

Figure 1. Outer row of figures 0°-360° clockwise; inner row quadrants 0°-90°. Double opposite verniers. This form is always furnished unless otherwise specified, except transits Nos. 6650 to 6652.

HORIZONTAL CIRCLE GRADUATIONS—Continued

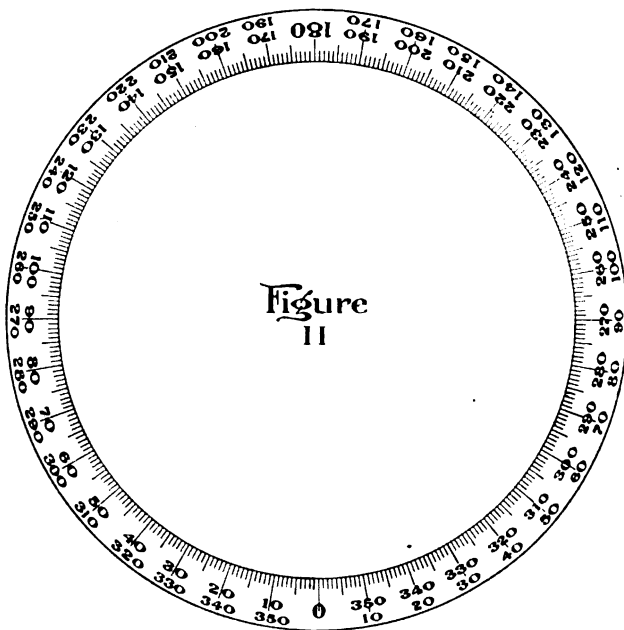


Figure II

Figure II. Two rows of figures 0° - 360° clockwise and counter-clockwise. Double opposite verniers. When so ordered, figures will be inclined in the direction in which they are read.

HORIZONTAL CIRCLE GRADUATIONS—Continued

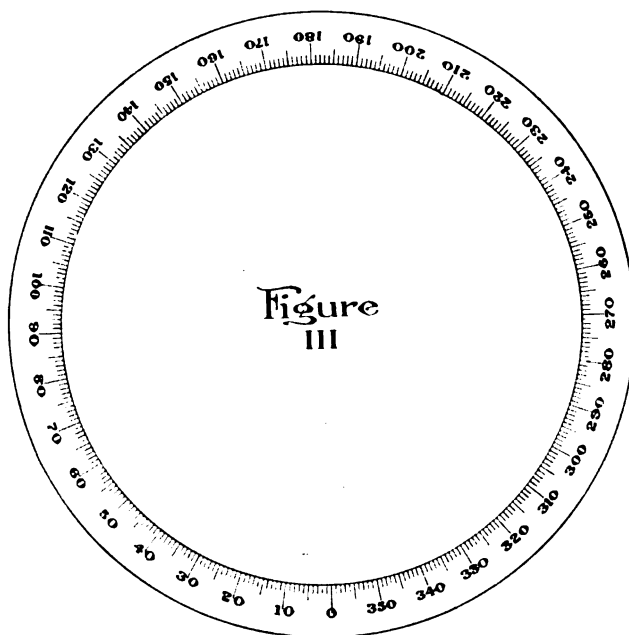


Figure III.

Figure III. One row of figures 0°-360° clockwise. Opposite single verniers.

HORIZONTAL CIRCLE GRADUATIONS—Continued

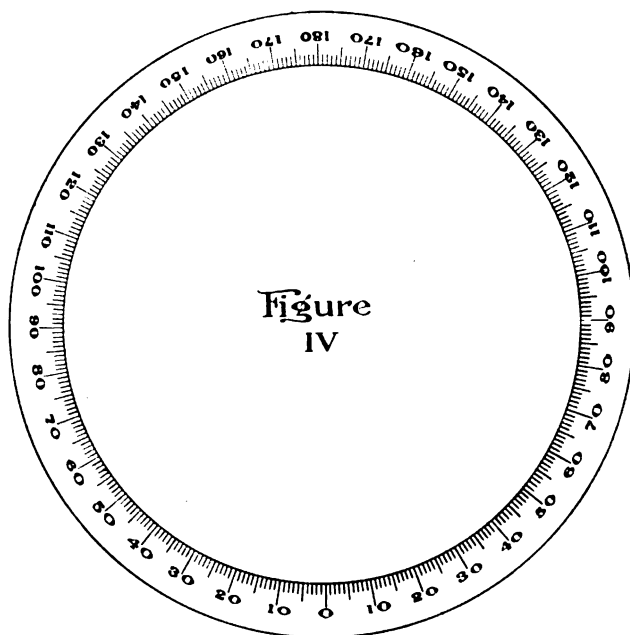


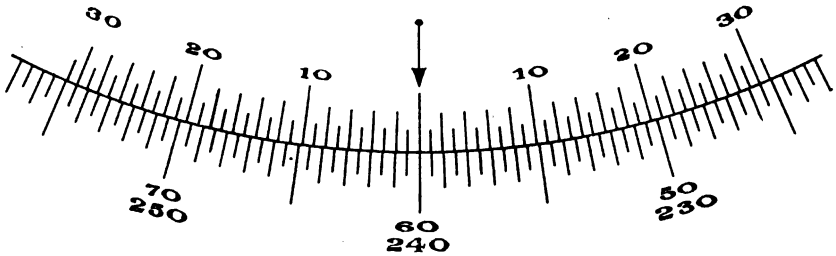
Figure IV

Figure IV. One row of figures 0° - 180° each way. Usual figuring of Transits No. 6650 to No. 6652. One double vernier.

VERNIERS

Verniers to horizontal circles are placed 30° to line of sight (unless they are especially ordered otherwise), which facilitates the reading of angles while the operator is in the same position as when sighting through the telescope. Graduations are on solid silver.

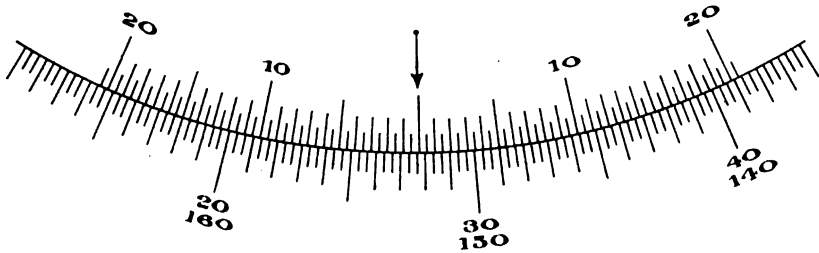
Graduations Reading to Minutes



Style 1

Style 1. Limb divided into $30'$ spaces. Double opposite verniers. 29 spaces into 30 reading to minutes.

Graduations Reading to 30 Seconds

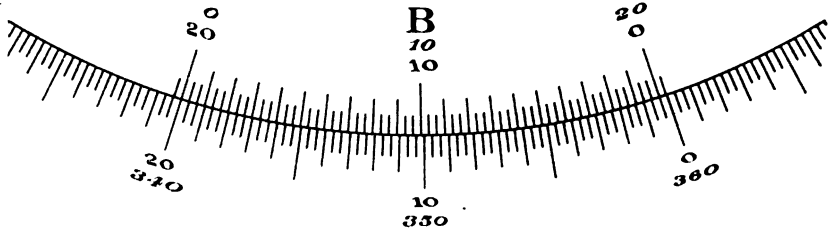


Style 2

Style 2. Limb divided into $20'$ spaces. Double opposite verniers. 39 spaces into 40 reading $30''$.

VERNIERS—Continued

Graduation Reading to 20 Seconds



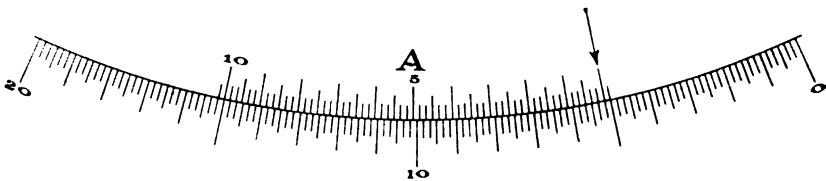
Style 3

Style 3. Limb divided into 20'. Single opposite verniers. 59 spaces into 60 reading 20". Two rows of figures.

Owing to the extreme length of the 20" vernier the use of double verniers is not permissible. Two rows of figures on a single vernier, however, answer practically the same purpose as double verniers.

A folding vernier may be used or double opposite verniers may be obtained by dividing the limb into 15' spaces, which style is more fatiguing to the eye than Style 3. However, Style 3 is generally conceded to be the best form for two rows of figures on limb.

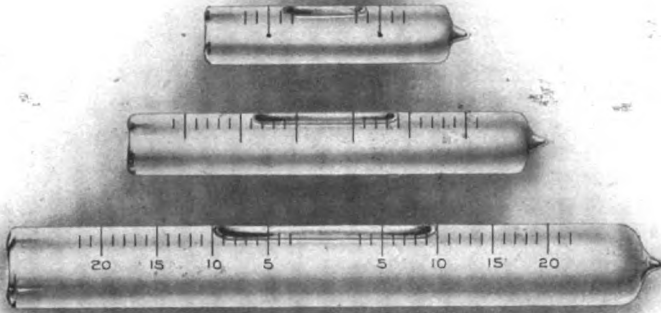
Graduations Reading to 10 Seconds



Style 4

Style 4. Limb divided into 10' spaces. Single opposite verniers. 59 spaces into 60 reading 10". Extra, \$30.00.

SPIRIT LEVELS



After untiring experiments and most exhaustive tests we have been able to obtain a fluid of practically the same specific gravity as Ether, but having the distinct advantage of being absolutely free from discoloration and a fluid perfectly homogeneous, retaining the cleanliness of the inner surface of the level vial, which is a feature of grave importance.

Our level vials are ground by a mechanical device which we are certain produces truer curves than can be ground by hand.

They are carefully tested before mounting and proper consideration given to the work required of them. Their value ranging from 10 to 50 seconds for transit telescopes, from 10 to 30 seconds for Wye and Dumpy Levels, and from 2 to 5 seconds in precise leveling instruments.

Vials for leveling instruments are graduated and figured on the glass, which allows a more distinct, clear reading than is afforded by the old style metal scale attached on the top of the vial case.

The plate levels are also ground mechanically, their value ranging from 40 seconds to 100 seconds. They are also graduated on the glass.

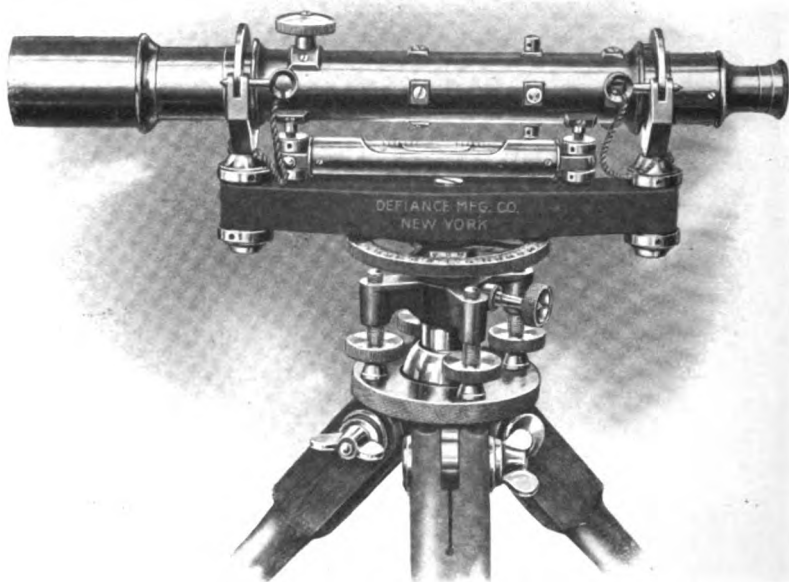
For precise leveling instruments the vials are chambered so that the constant length of the bubble may be maintained in varying temperatures.

A large stock of these spirit levels are carried at all times, and we are prepared to furnish all standard sizes at short notice.

It is necessary that the tube be sent to us when ordering.

Price according to size.

ARCHITECTS' WYE LEVEL



No. 6500.

"Defiance" Architects' Wye Level

This instrument has a telescope 12" long, with $1\frac{1}{4}$ " aperture, and is provided with two bell-metal bearing rings, which are accurately turned and are precisely the same diameter. It has rack and pinion movement to the object glass slide. The cross wires are focused by rotating a milled ring at end of eyepiece. The bar is strong. The Wyes are Phosphor Bronze. This instrument is adjusted precisely the same as our larger Wye Levels.

A horizontal circle reading to 5' is provided. This circle may be turned on the socket to suit any sighting.

Instrument has clamp but no tangent.

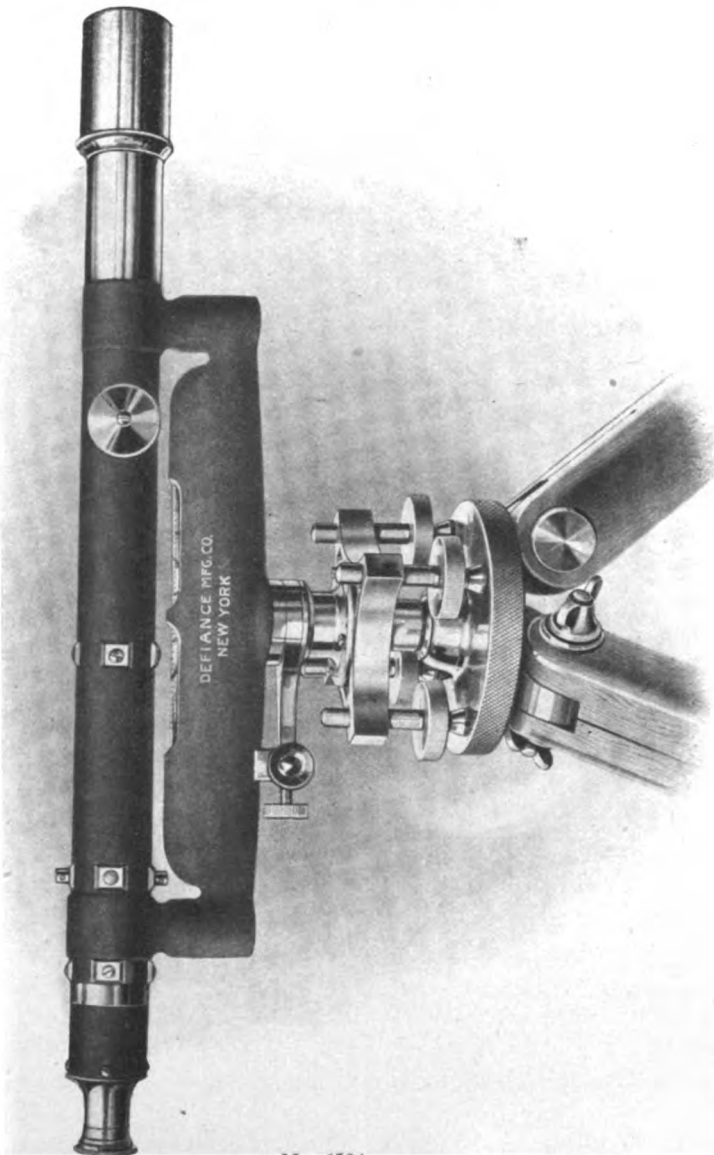
A trivet plate (having three removable steel points) for convenience in setting the instrument on a wall is furnished in addition to the regular plain leg tripod.

Instrument is complete in mahogany case with strap and hooks, containing trivet plate, plumb-bob, sunshade, screw-driver, adjusting pins.

Weight of instrument, 6 lbs.; tripod, $6\frac{1}{2}$ lbs.

No. 6500.	"Defiance" Architects' Wye Level.....	Each, \$50 00
6501.	Same as No. 6500, having clamp and tangent.....	" 55 00
6502.	Same as No. 6501, but with compass.....	" 65 00

DUMPY LEVELS



No. 6504

"Defiance" Dumpy Level
(Patented July 7th, 1915)

18" telescope.....Price, \$100 00

“DEFIANCE” DUMPY LEVEL

The construction of our Dumpy Level differs from other makes, being extremely low and compact, thus affording extraordinary rigidity and accuracy, together with greater protection to the spirit level.

The general construction is most unique, the bar is round and hollow and with its upper portion integral completely encasing the spirit level, forms a cylindrical surface which offers the least possible resistance to the wind and greatest protection to the spirit level unapproached in other instruments.

The Defiance Dumpy is superior to any instrument of the same focal length, magnification and sensitiveness of bubble.

The telescope is provided with dust guard to object glass slide.

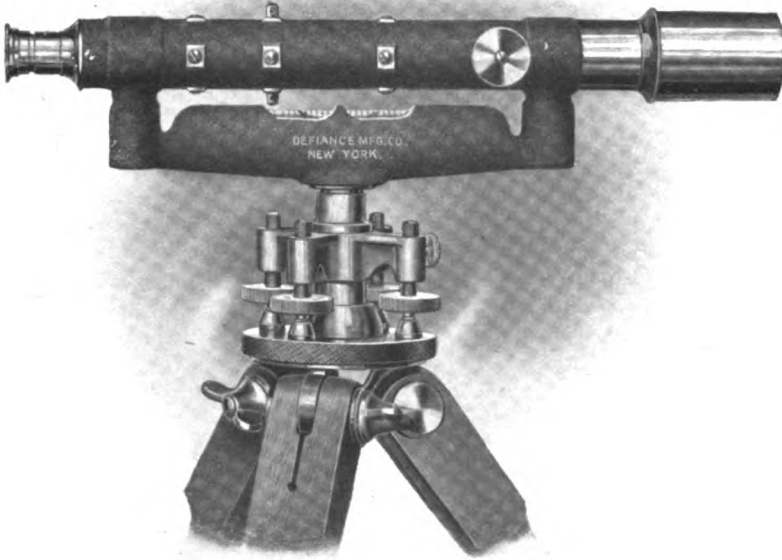
Equipped with clamp and tangent screw.

The entire instrument above the leveling head is cloth finished.

Weight of instrument, 10½ lbs.; tripod, split leg, 8½ lbs.

- | | | |
|-----------|---|----------|
| No. 6504. | Dumpy Level, with 18" Erecting Telescope, power 32 diameters, and split leg tripod..... | \$100 00 |
| 6505. | Same as No. 6504, but 15" Inverting Telescope, power 28 diameters | 90 00 |
| | Weight of instrument, 9½ lbs.; tripod, split leg, 8½ lbs. | |

DUMPY LEVELS—Continued



No. 6506

"Defiance" Railroad Dumpy

(Patented July 7th, 1915)

This instrument is especially adapted for road building and running levels of every description where a light portable instrument is desired.

The instrument is of the same grade of material and design as the Defiance Dumpy described on the preceding page, the same general lines being followed in its construction.

The telescope is 12" long, 1 $\frac{1}{8}$ " aperture. Erecting eyepiece giving a large, clear, flat field.

The instrument has clamp, but no tangent. Being smaller it cannot be expected that as accurate results may be obtained as with the 15" or 18" Dumpy Levels.

Weight of instrument, 6 $\frac{1}{2}$ lbs.; plain leg tripod, 6 $\frac{1}{2}$ lbs.

No. 6506. Price.....Each \$60.00

ENGINEERS' WYE LEVELS

We manufacture five different sizes of Engineers' Wye Levels, having telescopes, 22, 20, 18, 15 and 12 inches in lengths.

The telescopes are provided with two bell-metal rings, $1\frac{1}{2}$ " in diameter. These rings are accurately turned and precisely the same diameter. The telescope has rack and pinion movement to object glass slide. The eye-piece is focused by rotating a milled ring at end. The 12" telescope has an aperture of $1\frac{1}{4}$ ", while the other levels have objectives $1\frac{3}{8}$ " diameter. They are of the type and construction described under telescope, page 293. The line of collimation being correct for all distances.

The level is 8" long. It is mechanically ground, graduated and figured, and may be furnished of any degree sensitiveness required. It being graduated and figured is preferable over the old style metal scale for reading the position of the bubble.

The wyes are made of phosphor bronze and are provided with two adjusting nuts. The arm at eyepiece end of telescope has a projection which, entering a recess in edge of bearing ring, insures the horizontal position of the cross wire. Level bar is symmetrical and of great strength, and carries on its eye end a clamp and tangent.

Long centre accurately turned in "dead centre" lathes, carefully and accurately fitted in a socket of phosphor bronze.

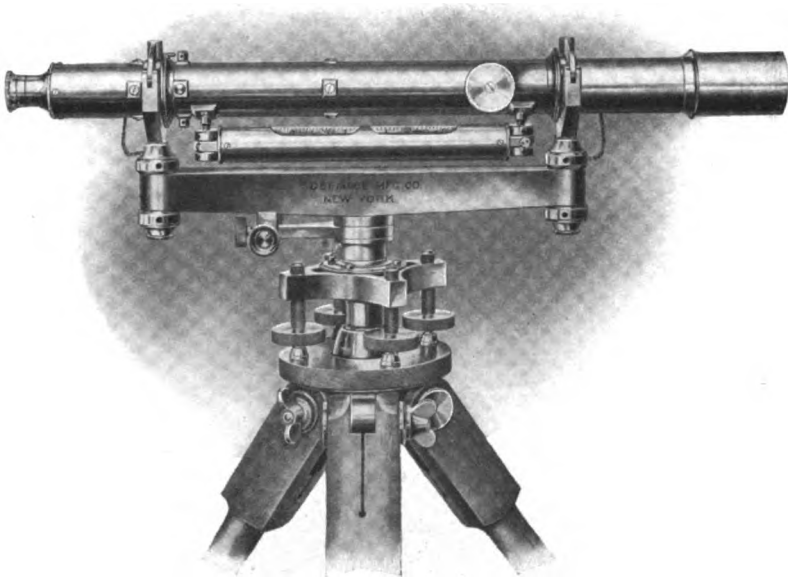
Clamp and tangent are attached to bar so they retain the same relative position at eyepiece end of telescope at all sightings, and may be operated with either hand very readily.

None of our levels are detachable above the leveling screws and are so fitted into mahogany cases.

Price includes mahogany case, with strap, hooks, screw-driver, sunshade, and adjusting pins. Plain leg tripod.

No. 6510.	Engineers' "Y" Level, 22" telescope ; weight, $11\frac{1}{2}$ lbs.	Price, \$115 00
6511.	" " " 20" " " 11 "	110 00
6512.	" " " 18" " " $10\frac{1}{4}$ "	110 00
6513.	" " " 15" " " $9\frac{1}{2}$ "	90 00

WYE LEVELS—Continued

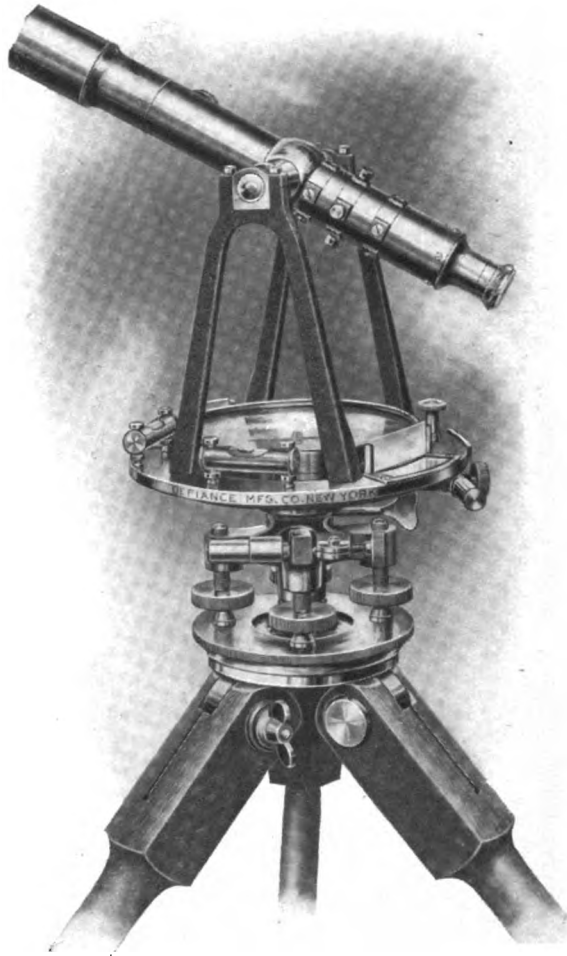


No. 6512

"Defiance" Engineers' 18" Wye Level

Price \$110 00

TRANSITS



No. 6520

"Defiance" Plain Engineers' Transit
Extra Fine Quality

For complete specifications, see following page.

PLAIN ENGINEERS' TRANSIT—Continued

Telescope—Length 11", magnifying power, 25 diameters; achromatic terrestrial, finest definition, balanced and reverses at both ends, object slide and eyepiece provided with dust protection.

Object Glass—Aperture 1½" diameter.

Eyepiece—Improved achromatic giving large, clear, flat field.

Standards are cloth finished.

Horizontal Circle—Diameter 6½", graduated on Solid Silver, two rows of figures, 0°-360° and 0° 90° each way, as figure 1, page 299.

Verniers—Two double opposite verniers with ground glass shades, reading to thirty seconds, placed at an angle of 30° to line of sight, graduated on **Solid Silver**.

Compass—Needle 5" long, graduations are silvered with one row of figures, 0°-90° on each side of N. and S.

Centres—Anti-friction composition carefully fitted, long and tapered with broad flanges. Four leveling screws. Shifting centre and improved clamp and tangent screw with opposing spiral spring.

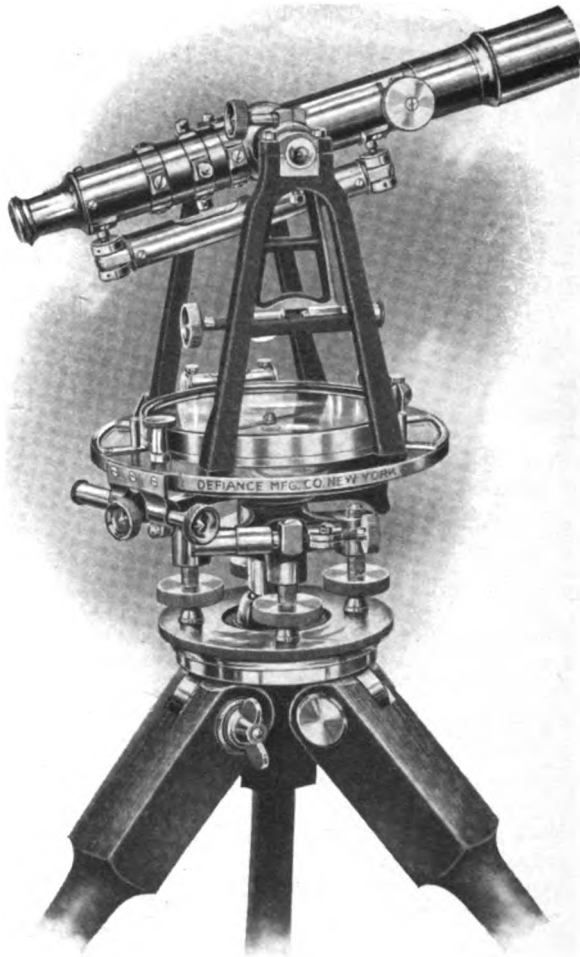
Weight—Instrument 12½ lbs.; split leg tripod, 8½ lbs.

No. 6520. Plain Engineers' Transit, packed in mahogany case, with plumb bob, reading glass, adjusting pins, sunshade and screwdriver. Split leg Tripod..... \$185 00

6521. Plain Engineers' Transit like No. 6520, but with clamp and tangent screw to telescope axis. Packed in mahogany box, with accessories. Split leg Tripod..... 195 00

The above instrument can be furnished with vernier to horizontal circle reading to single minutes and can be supplied with 6½" horizontal circle if desired.

TRANSITS—Continued

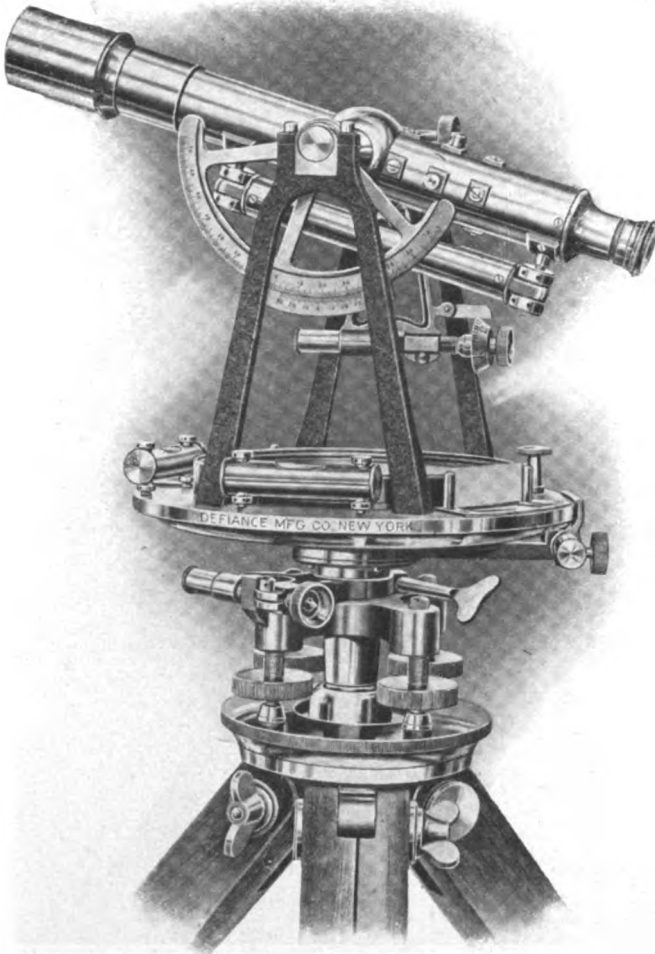


No. 6522

"Defiance" Engineers' Transit, with Level Attachment
Extra Fine Quality

No. 6522. Engineers' Transit, with **Level Attachment** (specifications same as No. 6520). Clamp and tangent screw to telescope axis, fixed stadia hairs, ground glass vernier shades, graduations on **Solid Silver** reading to thirty seconds, level vial 6" long, graduated on the glass and ground to a sensitiveness of about thirty seconds of arc per graduation. Packed in mahogany box, with accessories. Split-leg tripod.....Each, \$220 00

TRANSITS—Continued

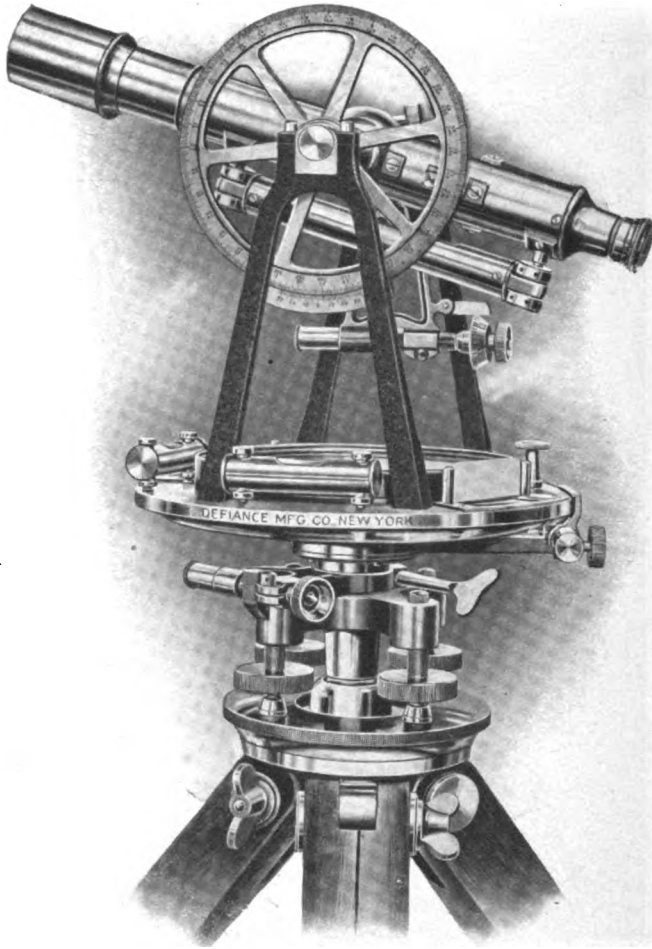


No. 6523

"Defiance" Engineers' Transit, with Level Attachment and Vertical Arc
Extra Fine Quality

No. 6523. Engineers' Transit, with **Level Attachment** and **5" Vertical Arc**, graduated on **Solid Silver**, with vernier reading to single minutes (specifications same as No. 6520), gradienter screw, fixed stadia hairs, ground glass vernier shades, graduations on **Solid Silver** reading to 30 seconds, level vial 6" long, graduated on glass and ground to a sensitiveness of about 30 seconds of arc per graduation. Packed in mahogany box with accessories. Split-leg tripod..... Each, \$235 00

TRANSITS—Continued

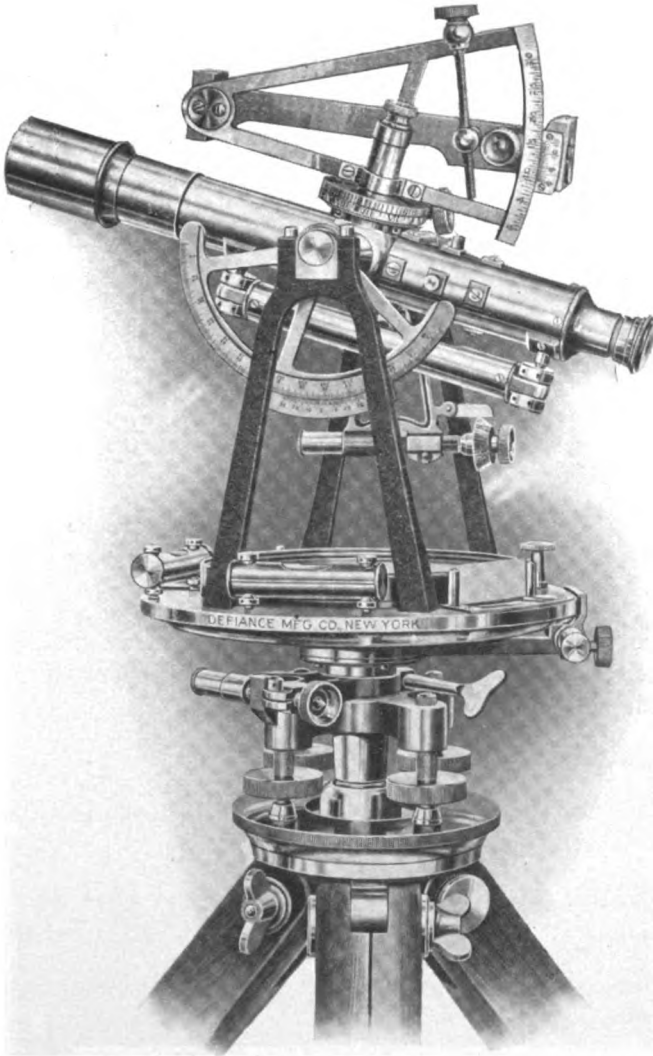


No. 6524

**"Defiance" Engineers' Transit
With Level Attachment and Vertical Circle
Extra Fine Quality**

No. 6524. Engineers' Transit, with **Level Attachment** and **Vertical Circle**, $4\frac{1}{2}$ " diameter, graduated on **Solid Silver**, with vernier reading to single minutes (specifications same as No. 6522).....Each, \$240 00

TRANSITS—Continued



No. 6530

"Defiance" Engineers' and Surveyors' Transit With Solar Attachment

No. 6530. Engineers' and Surveyors' Transit, complete, with **Vertical Arc**, 5" diameter, graduated on **Solid Silver**, with vernier reading to single minutes (specifications same as No. 6520), with gradienter and improved Solar Attachment.....Each, \$300 00

THEODOLITES

Telescope—Length, 9", magnifying power, 25 diameters, achromatic terrestrial of finest definition, balanced, reversed at both ends; object slide and eyepiece provided with dust protectors.

Object Glass—Aperture, 1½" diameter.

Eyepiece—Improved achromatic, giving a large, clear, flat field.

Standards—U-shaped, cloth finished.

Verniers—Two, double opposite verniers, with shades, reading to minutes. placed at an angle of 30 degrees to line of sight, graduated on solid silver.

Centres—Anti-friction composition, carefully fitted, long, tapered, broad flanges. Four leveling screws, shifting centre, improved clamp and tangent, with opposing spiral spring.

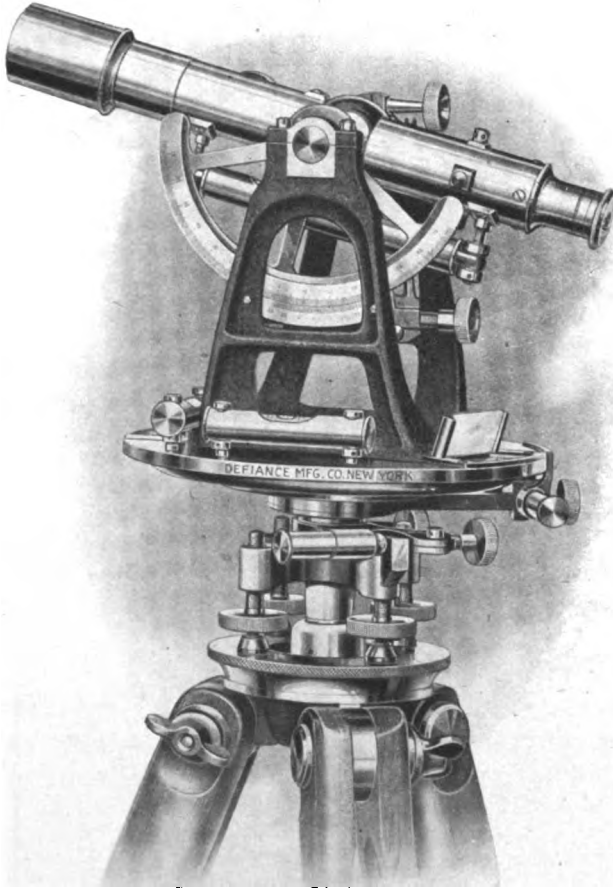
Weight—Instrument, 10½ lbs.; tripod, 8½ lbs.

No. 6535. Defiance Theodolite, with split leg tripod, in mahogany box, with accessories.....Each \$210 00

6536. Defiance Theodolite, like No. 6535, but with three leveling screwsEach 225 00

Box compass can be furnished with either of the above instruments for \$12.00 extra.

THEODOLITES—Continued



No. 6535

"Defiance" Theodolite. Price, \$210 00.

THEODOLITES—Continued

SPECIFICATIONS.

Telescope—Length 12", magnifying power, 32 diameters; achromatic terrestrial, finest definition, balanced, and reversible through standards and over bearings, object slide and eyepiece provided with dust protectors.

Object Glass—Aperture 1½" diameter.

Eyepiece—Erecting improved achromatic, giving large, clear, flat field.

Standards are cloth finished.

Horizontal Circle—6½" in diameter, graduated in Solid Silver, two rows of figures, 0° to 360° and 0° to 90° each way, as Fig. 1, page 299.

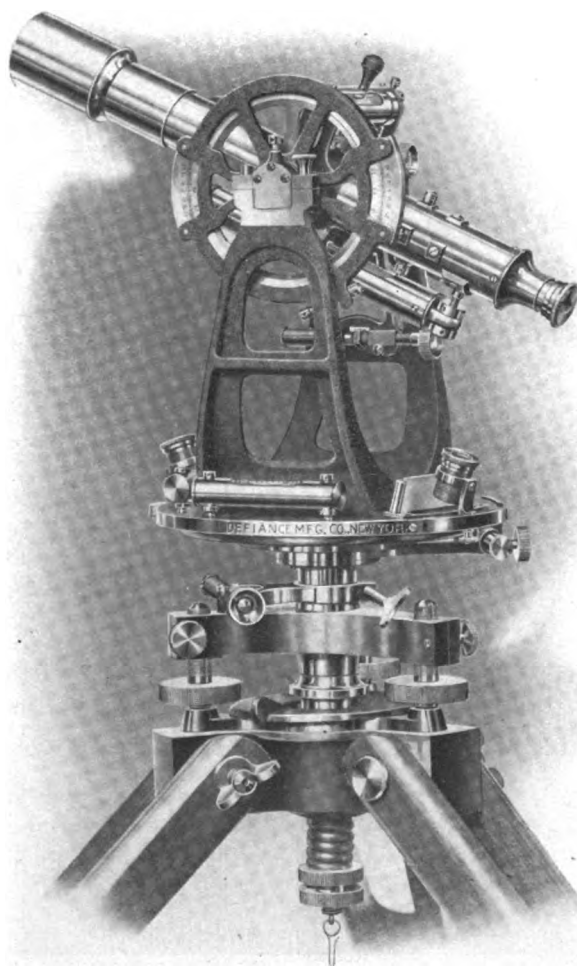
Verniers—Two double opposite verniers, with shades reading to 30 seconds, placed at an angle of 30° to line of sight, graduated on Solid Silver.

Centres—Anti-friction composition, carefully fitted, long and tapered, with broad flanges. Three leveling screws, shifting centres, improved clamp and tangent screw, with opposing spiral spring.

Weight—Instrument, 15½ lbs.; tripod, 11 lbs.

No. 6540. Engineers' Theodolite, packed in mahogany case, with plumb bob reading glass, adjusting pins, sunshade and screw driver. Split leg tripod..... \$270 00

THEODOLITES—Continued



No. 6540

"Defiance" Engineers' Theodolite

No. 6540. Three Leveling Screws.

LIGHT MOUNTAIN AND MINING TRANSIT—Continued

SPECIFICATIONS

Telescope—Length $8\frac{1}{2}$ "; magnifying power, 22 diameters; achromatic terrestrial, finest definition, balanced, and reverses at both ends, object slide and eyepiece provided with dust protectors.

Object Glass—Aperture $1\frac{1}{8}$ " diameter.

Eyepiece—Improved achromatic, giving large, clear, flat field.

Standards are cloth finished.

Horizontal Circle—Diameter, $5\frac{1}{2}$ "; graduated on Solid Silver, two rows of figures 0° to 360° and 0° to 90° each way, as Fig. 1, page 297.

Verniers—Two double opposite verniers, with shades, reading to single minutes, placed at an angle of 30° to line of sight, graduated on Solid Silver.

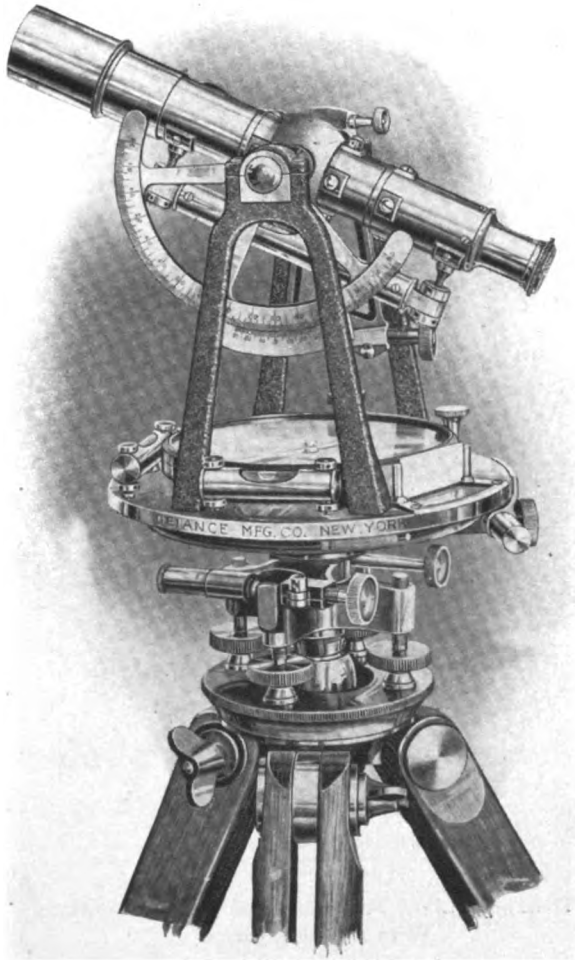
Compass—Needle $3\frac{1}{8}$ " long. Graduations are silvered with one row of figures, 0° to 90° on each side of N. and S., variation arc for offsetting the variation of the needle.

Centres—Anti-friction composition, carefully fitted, long and tapered, with broad flanges. Four leveling screws, shifting centres, improved clamp and tangent screw, with opposing spiral spring.

Weight—Instrument, 10 lbs.; extension tripod, $7\frac{1}{2}$ lbs.

No. 6550. Mountain and Mining Transit, with extension tripod, in box, with leather case, etc..... \$225 00

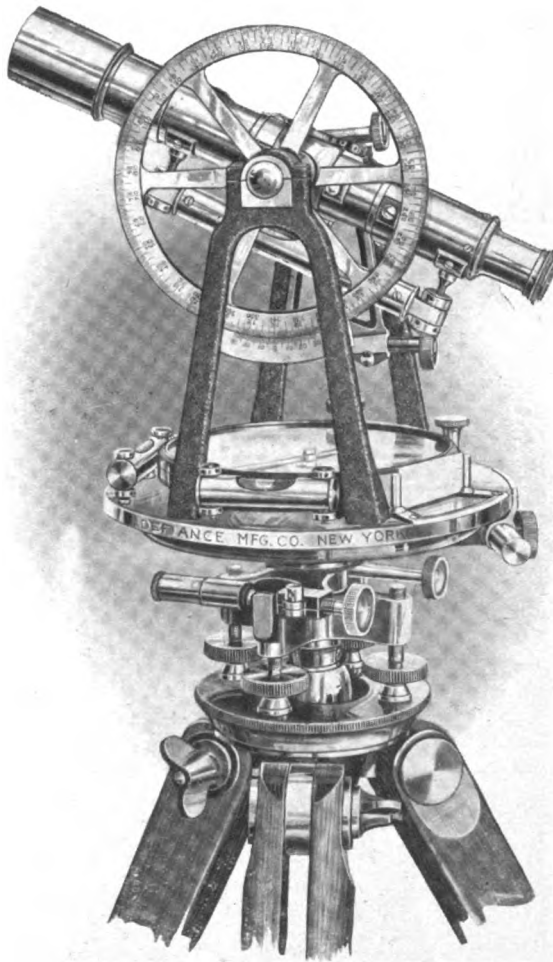
TRANSITS



No. 6550

"Defiance" Light Mountain and Mining Transit

TRANSITS—Continued



No. 6551

"Defiance" Light Mountain and Mining Transit With Vertical Circle

No. 6551. Light Mountain and Mining Transit, with **Vertical Circle, 4½"** diameter (specifications same as No. 6550), granienter screw, fixed stadia hairs, ground glass shades, all graduations on **Solid Silver**, extension tripod, in mahogany box, etc.....Each, \$240 00

No. 6552. Same as No. 6551, but with aluminum guard to **Vertical Circle**.
Each, \$250 00

RAILROAD ENGINEERS' TRANSIT (PLAIN)—Continued

Telescope—Length, 11"; magnifying power, 25 diameters; achromatic terrestrial, finest definition, balanced, and reverses at both ends, object slide and eyepiece provided with dust protectors.

Object Glass—Aperture, 1½" diameter.

Eyepiece—Improved achromatic, giving large, clear, flat field.

Standards are cloth finished.

Horizontal Circle—Diameter 6¼", graduated on Solid Silver, two rows of figures, 0°-360° and 0°-90° each way, as Fig. 1, page 299.

Verniers—Two double opposite verniers with shades, reading to single minutes, placed at an angle of 30° to line of sight, graduated on **Solid Silver**.

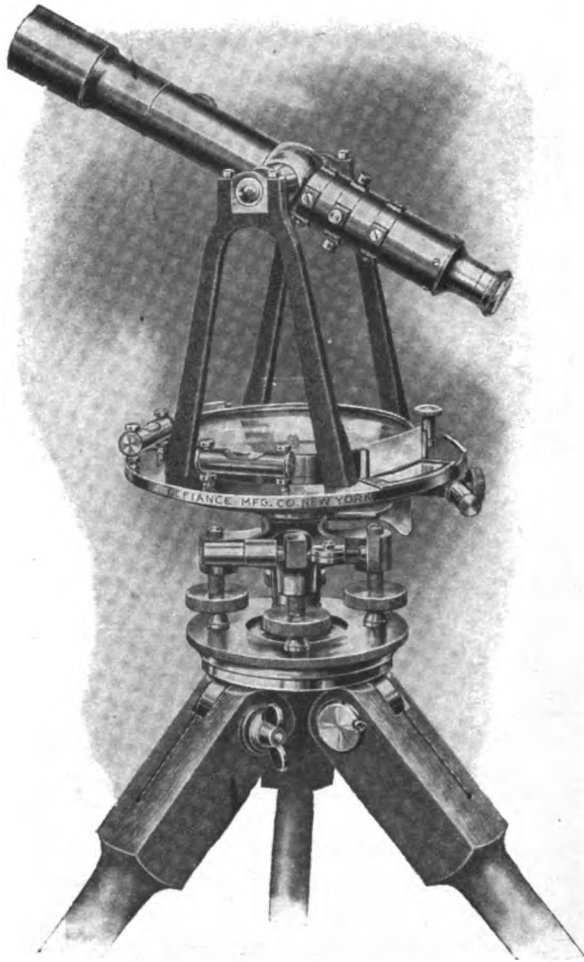
Compass—Needle 4½" long, graduations are silvered with one row of figures, 0°-90° on each side of N. and S.

Centres—Anti-friction composition carefully fitted, long and tapered with broad flanges. Four leveling screws. Shifting centre and improved clamp and tangent screw with opposing spiral spring.

Weight—Instrument 12½ lbs., tripod 8½ lbs.

No. 6600. Plain Engineers' Transit, packed in mahogany case, with plumb bob reading glass, adjusting pins, sunshade and screw driver. Split leg tripod..... \$155 00

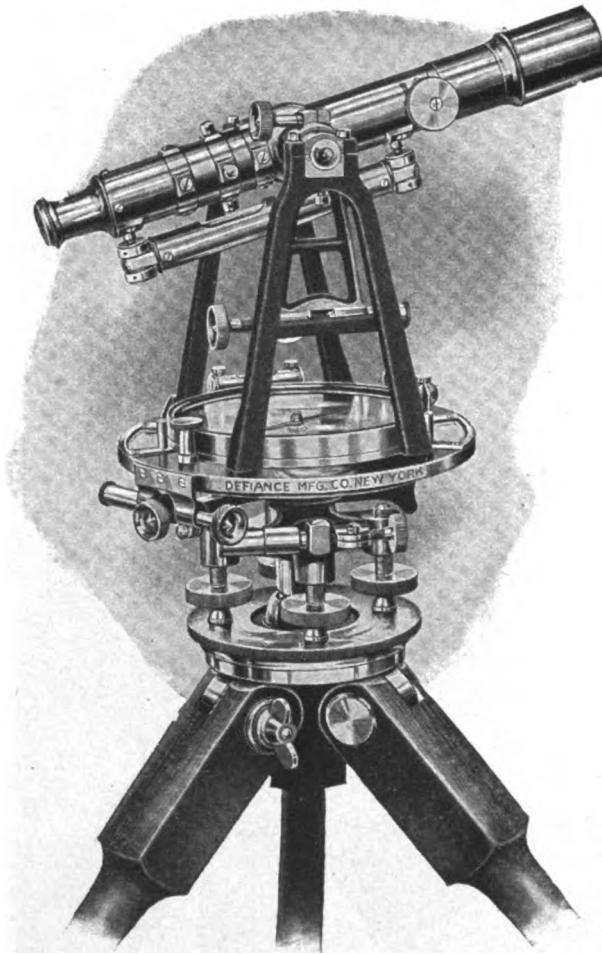
TRANSITS—Continued



No. 6600

"Defiance" Railroad Engineers' Transit (Plain)

TRANSITS—Continued

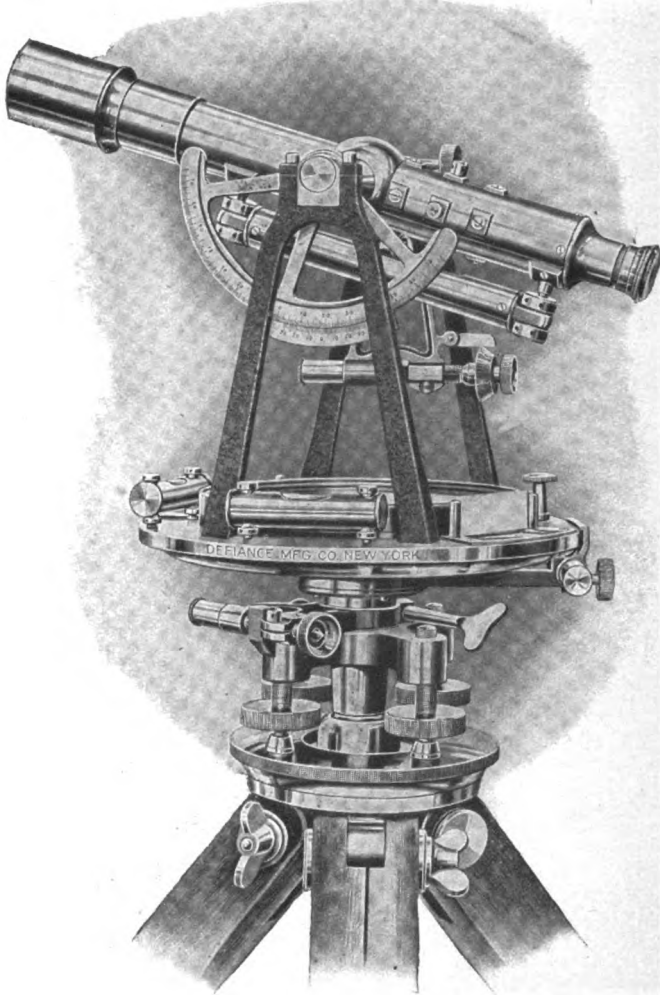


No. 6601

"Defiance" Railroad Engineers' Transit With Level Attachment

No. 6601. Railroad Engineers' Transit, with **Level Attachment** (specifications same as No. 6600), clamp and tangent screw with telescope axis, level vial 6" long, graduated on the glass and ground to a sensitiveness of about 30 seconds of arc per graduation. Packed in mahogany box with accessories, etc.....Each, \$177 00

TRANSITS—Continued



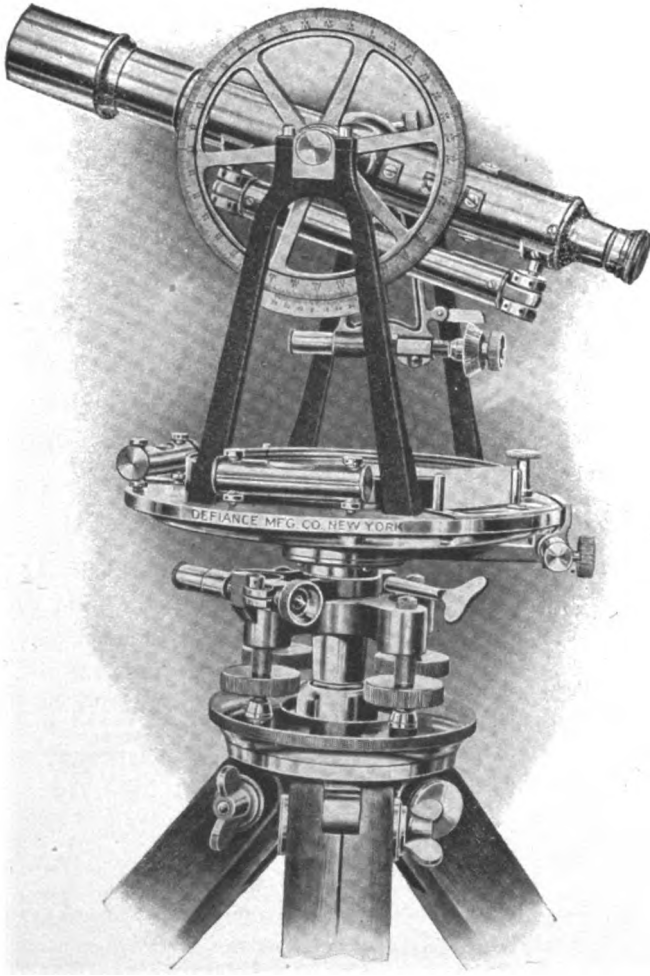
No. 6602A.

"Defiance" Railroad Engineers' Transit With Level Attachment and Vertical Arc

No. 6602. Railroad Engineers' Transit, with **Level Attachment** and **Vertical Arc**, 5" in diameter, graduated on **Solid Silver**, with vernier reading to single minutes (specifications same as No. 6600), clamp and tangent screw to telescope axis, level vial 6" long, graduated on glass and ground to a sensitiveness of about thirty seconds of arc per graduation. Packed in mahogany box, with accessories. Split-leg tripod.....Each, \$185 00

No. 6602A. Same as No. 6602, but with granienter attachment,
Each, \$195 00

TRANSITS—Continued



No. 6603A.

"Defiance" Railroad Engineers' Transit With Level Attachment and Vertical Circle

No. 6603. Railroad Engineers' Transit, with **Level Attachment** and **Vertical Circle**, $4\frac{1}{2}$ " in diameter, graduated on **Solid Silver**, with vernier reading to single minutes (specifications same as No. 6600), clamp and tangent screw to telescope axis, level vial 6" long, graduated on glass and ground to a sensitiveness of about thirty seconds of arc per graduation. Packed in mahogany box, with accessories. Split-leg tripod.....Each, \$190 00

No. 6603A. Same as No. 6603, but with gradienter attachment,
Each, \$200 00

SOLAR ATTACHMENT

This Solar Attachment is practically the same as that of the Burt Solar Compass invented by William A. Burt, but with improvements of our own which add to its efficiency.

The principle consists of a practical scientific application of the principles which govern the motion of the earth with relation to the sun. The instrument when placed in adjustment, and the sun's image brought to the proper place, the telescope must necessarily be in the meridian.

This attachment is a valuable addition to any transit where mineral deposits, trolley line, etc., etc., with their local magnetic attraction will not permit the accurate use of the compass. In this kind of work it fills a real need.

A disc is secured to the cross axis of the transit telescope which carries the Polar Axis adjustable with four capstan head screws.

The hour circle is fastened to the base of the Polar Axis and is adjustable. It is graduated on Solid Silver to 5 minutes of time and figured from 1—12. Declination Arc carries an index by which the hour circle is read.

The Declination Arc is graduated on Solid Silver in 15' spaces and is read by vernier to single minutes.

Transits furnished with this Solar Attachment have the vertical arc figured in the regular way and in addition an inner row of figures 90°-10° each way for reading the latitude direct.

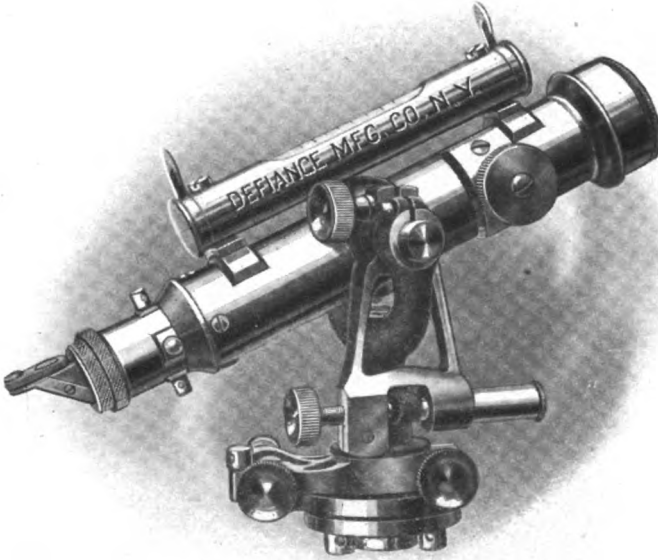
This Solar especially recommends itself, owing to its accuracy, and being light it in no way affects the counterpoise of the instrument.

It may be readily removed from the instrument and placed in the transit box when not in use.

When removing and replacing this attachment (owing to its construction) neither its own adjustment or those of the transit are in any way disturbed, a strong point to be remembered.

No. 6600. Price.....\$60 00

TELESCOPIC SOLAR



No. 6612

The Telescopic Solar is commendable, having the following advantages: Accuracy, Simplicity, Easy Adjustment. It can be used as a vertical sighting telescope. It permits observation when the sun is partly obscured by clouds. It has no declination arc.

The power of the Solar telescope is proportionate with that of the main telescope. It is 6 inches long with inverting eyepiece and is furnished with diagonal prism and color glass.

Like the Burt, the Telescope Solar is secured to the cross axis of the instrument and the Polar Axis is adjustable with four capstan head screws.

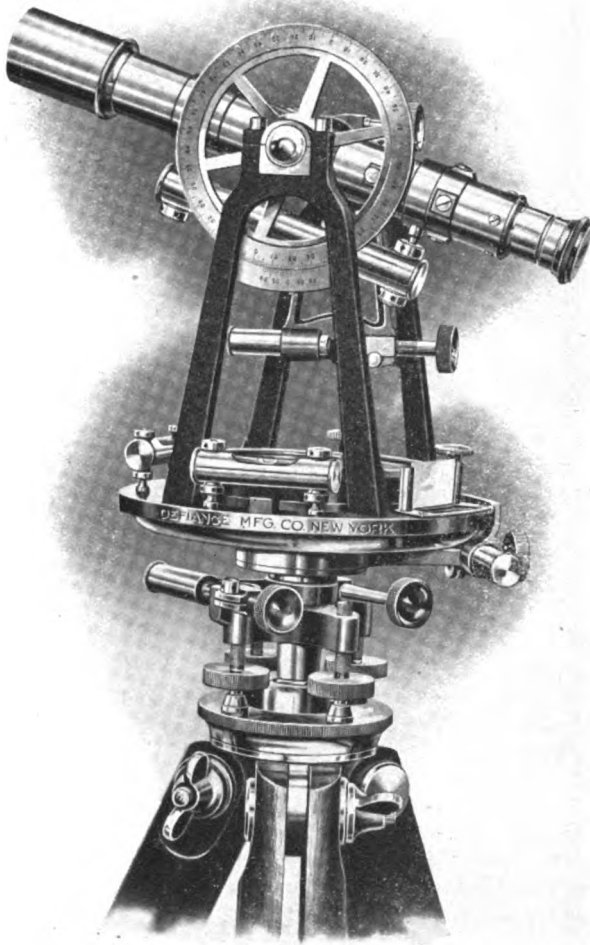
The Telescope is movable in altitude, in its standard, and in azimuth about the Polar Axis. Both vertical and horizontal axis are provided with improved clamp and tangents with opposed springs.

A spirit level mounted on the top of the solar telescope is provided with two pointers so attached that when the shadow of one falls upon the other the sun will be in the field of view.

The Telescopic Solar may be removed and replaced without affecting either its own or the adjustment of the transit.

No. 6612.	Price.....	\$50 00
6614.	Counterpoise for vertical sighting.....	Extra, 5 00

RECONNOISSANCE TRANSITS



No. 6650

"Defiance" Reconnaissance Transit

In response to a demand for a very light instrument, at a moderate price, for rapid work, we have designed our Reconnaissance Transit, specially adapted for general engineering work. This Transit is constructed with the same care as our more expensive instruments.

For complete specifications, see next page.

RECONNOISSANCE TRANSIT—Continued

SPECIFICATIONS

Telescope—Length 8", magnifying power, 20 diameters; achromatic terrestrial, of fine definition, balanced, and reverses at both ends, object slide and eyepiece provided with dust protectors; fixed stadia hairs.

Object Glass—Aperture, $\frac{1}{8}$ " diameter.

Vertical Circle— $3\frac{1}{2}$ " diameter, graduated on Solid Silver with double vernier reading to five minutes.

Standards are cloth finished.

Horizontal Circle—Diameter about 5", graduated on Solid Silver, one row of figures, 0° to 180° , as Fig. IV, page 302.

Vernier—One double vernier, reading to minutes.

Compass—Needle $3\frac{1}{8}$ " long, graduations are silvered, with one row of figures, 0° to 90° on each side of N. and S., with variation arc.

Centres—Anti-friction composition, carefully fitted, long and tapered, with broad flanges. Four leveling screws, shifting centre, and improved clamp and tangent screw, with opposing spiral spring.

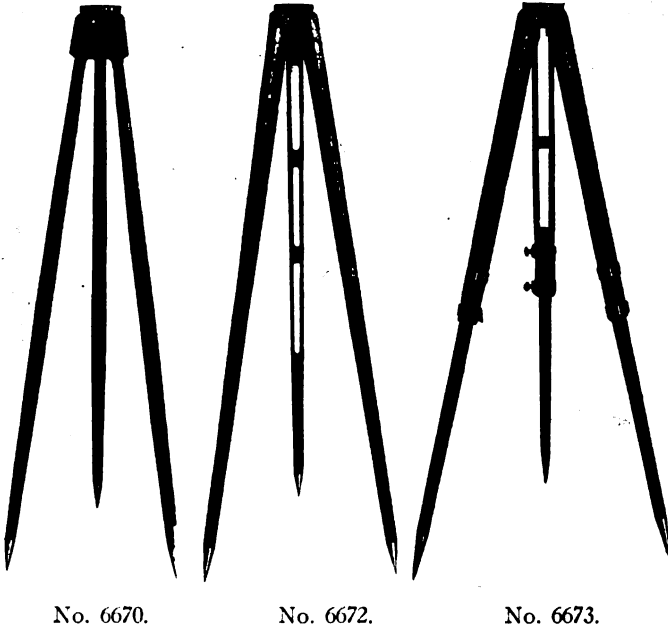
Weight—Instrument, $7\frac{1}{4}$ lbs.; extension tripod, $6\frac{1}{2}$ lbs.

- No. 6650. Reconnaissance Transit, with light extension tripod, in box, with accessoriesEach, \$115 00
6651. Reconnaissance Transit, same as above, but 4" are reading to minutes..... 122 00
6652. Reconnaissance Transit, same as above, but with $4\frac{1}{2}$ " vertical circle, reading to minutes..... 125 00

ATTACHMENTS AND EXTRAS

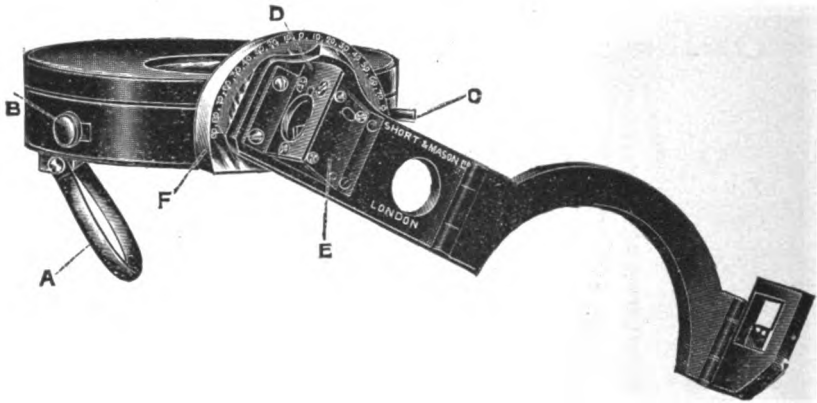
Right Angles, Sights on Standards.....	\$8 00
Reversion Level.....	15 00
Variation Arc, added to any of our transits if ordered with instrument	4 00
Variation Arc, added to transits sent for repair.....	15 00
Vertical Circle, 3½" diameter with vernier to 5 minutes.....	8 00
Vertical Circle, 4½" diameter with vernier to 1 minute.....	12 00
Vertical Circle, 5" diameter with vernier to 1 minute.....	15 00
Vertical Circle, 4½" diameter, with two opposite verniers to 1 minute and aluminum guard	35 00
Vertical Arc, 5" diameter.....	12 00
Vertical Arc, 6" diameter, with vernier to 30 seconds.....	18 00
Aluminum Guard for Vertical Circle	6 00
Level on Telescope, graduated and mechanically ground.....	12 00
Clamp and Tangent to Telescope Axis.....	10 00
Gradiometer Attachment.....	10 00
Detachable Top Telescope.....	25 00
Reflector for illuminating cross wires.....	4 00
Diagonal Prism for eyepiece.....	10 00
Meta Mirror with universal joint for reading position of bubble while operator is at eyepiece end of instrument.....	10 00
Quick Leveling Attachment.....	6 00
Detachable Side Telescope and Counterpoise for vertical sighting....	25 00
Telescope Solar Attachment.....	50 00
Box Compass, 4" needle.....	12 00
Three Leveling Screw Head.....	15 00
Wooden Cap to protect tripod head.....	75
Tripod Bolt and Nut.....	50
Tripod Shoe.....	50
Screw Driver.....	15
Adjusting Pins..... Each	10
Cross Wire and Diaphragm.....	3 00
Stadia Wire and Diaphragm, fixed.....	7 00
Stadia Wires and Diaphragm, adjustable.....	5 00
Stadia Wires and Diaphragm, disappearing.....	10 00
Graduation of Horizontal Circles to read to 10 seconds..... Extra	30 00
Graduation of Vertical Arc or Circle to read to 20 or 30 seconds "	5 00
Burt Solar Attachment.....	60 00
Latitude Level.....	12 00
Striding Level for solar attachment.....	3 00
Leather Case with shoulder strap fitted over transit or level box, according to size	7 00 to 10 00
Mahogany Case, with strap, hooks, lock, etc.....	4 00 to 6 00
Edge Graduations to vertical circle (made to order only).....	15 00
Object Glass, complete..... \$6 00 to	10 00
Eyepiece, complete.....	6 00
Shade for object glass...	75
Cap for eyepiece or object glass.....	75
Leveling Screws.....	1 00 to 1 50
Clamp Screws, limb, axis and leveling head.....	75
Ground Glass Vials for plate.....	35
Ground Glass Vials, graduated, for telescope.....	1 25 to 5 00
Needle, complete.....	3 00
Center Pin.....	50
Vernier Window.....	75
Vernier Shade.....	50

TRIPODS



No. 6670.	Solid Leg Tripod for levels and transits.....	Each,	\$10 00
6671.	“ “ “ “ architects’ levels, light.....	“	5 00
6672.	Split “ “ “ levels and transits.....	“	12 00
6673.	Extension “ “ “ “ “	“	15 00
6674.	“ “ “ reconnaissance transits.....	“	12 00
6675.	Tripod Legs for engineers’ transit or level...Per set of three,		5 00
6676.	Split Tripod Legs for engineers’ transit or level. Per set of three		7 00
6677.	Extension Tripod Legs for engineers’ transit or level Per set of three.....		10 00
6678.	Tripod Head with bolts and nuts.....	Each,	5 00

VERSCHOYLE POCKET TRANSIT



No. 6700.

This instrument combines the useful features of the Abney Level, Prismatic Compass and Clinometer, and was designed by a mining engineer of practical experience in the use and possible application of the various forms of instruments intended for preliminary survey.

Owing to its novel construction, only one observation is necessary to obtain both the magnetic bearing and the vertical angle of any distant point. It is also specially adapted for use in difficult positions, such as are always liable to occur in filling in the rougher details in a mining survey.

To use the instrument for obtaining horizontal and vertical angles, after freeing the needle and unfolding the arm, grasp the compass box in the left hand, and then with the extended fingers of the right hand lightly grasp the arm and bring the distant target or light to

the intersection of the cross lines at the end of the arm. When holding the arm firmly in that position, with the left hand slightly revolve the compass box until the small level bubble is seen through the prism to be at the central mark. The magnetic bearing will now be plainly visible in the prism at the same time that the target is viewed along the sight line, and the angle of depression or elevation is automatically recorded on the vertical arc. Both readings can then be booked at the same time without further observation.

VERSCHOYLE POCKET TRANSIT—Continued

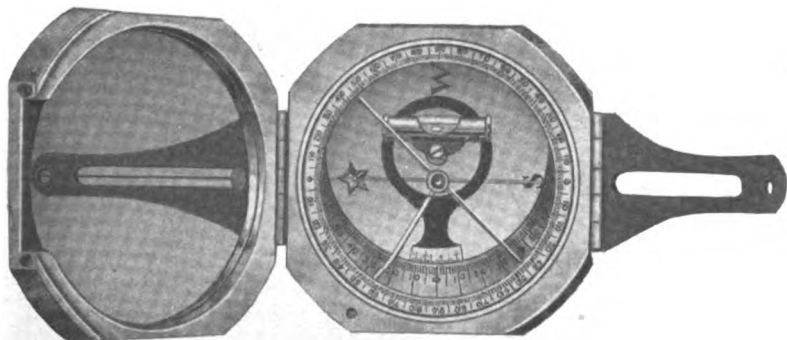
To use the instrument as a clinometer, lay the bottom side of the arm on the object to be observed, and looking through the window at the top of the compass box slightly revolve the box until the small bubble comes to the center. The angle may then be read off the vertical arc.

Should it be necessary to alter the relative position of the divided ring and the magnetic needle, this can be accomplished by removing the cover and altering the position of the needle immediately under the divided ring. Adjustment for magnetic variation may be obtained in this manner, without liability to disturb other adjustment.

Designed as a thoroughly serviceable instrument, it is constructed to withstand rough usage and is not liable to derangement or deterioration. There are no reflectors or mirrors used other than the prism, which is protected and fastened in a secure manner.

No. 6700. Verschoyle Pocket Transit, bronzed brass, $3\frac{1}{8}$ " diameter, needle about 2", aluminum ring graduated to half degrees, arc giving vertical angles graduated to degrees. Weight of instrument about 15 ounces, in leather sling case.....Each, \$40 00

BRUNTON PATENT POCKET COMPASS



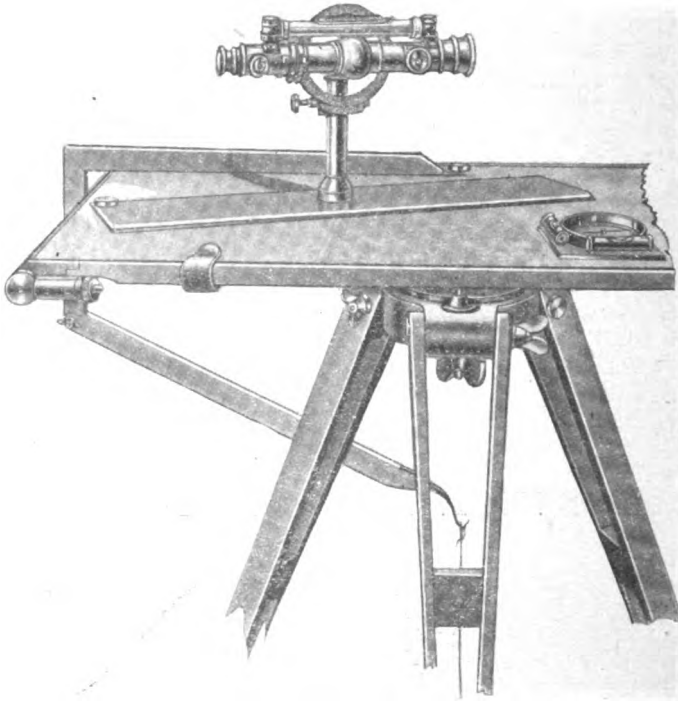
No. 6710.

A complete, accurate and reliable pocket instrument for the taking of topography and preliminary surveys of every description, either on the surface or underground, this taking the place of a sighting compass, clinometer, prismatic compass and Abney level, combining all in one light and handy instrument. The case is made of aluminum, $2\frac{1}{4} \times 2\frac{1}{4} \times 1$ ". Weight of instrument about 8 ounces.

No. 6710. Brunton Patent Pocket Transit, with directions.....Each, \$25 00

THE PLANE TABLE

With Leveling Screws and Tangent Movement



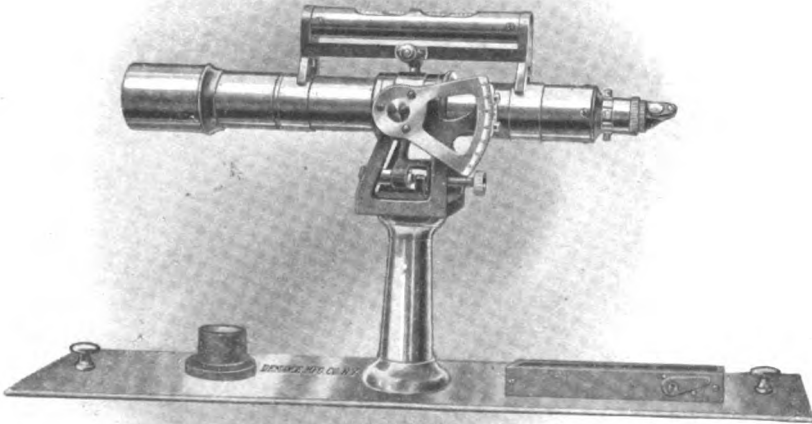
No. 6750.

- No. 6750. Plane Table, board 24×30", mounted on large tripod with leveling socket and clamp, and with plumbing bar, plummet and clamps for paper, combined compass and levels with square base, Alidade, with telescope 11" long, with stadia, $4\frac{1}{2}$ " vertical circle vernier to 1 minute level on telescope, and clamp and tangent column. Power of telescope 24 diameters; set of 3 leveling screws and tangent for movement in azimuth.....\$170 00

EXTRAS

- No. 6752. Set of 3 leveling screws to Plane Tables..... \$10 00
 6754. Clamp and tangent for movement in azimuth to Plane Tables 10 00

“DEFIANCE” ALIDADE

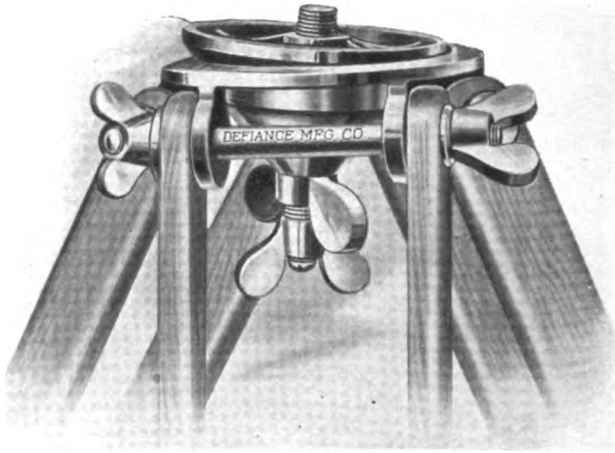


No. 6760.

No. 6760. Alidade, blade 18" long 3" wide, with circular spirit level, aluminum pillar; telescope 11" long with $1\frac{1}{2}$ " aperture, stadia wires, inverting eyepiece, giving clear flat field. The instrument will be furnished with erecting eyepiece unless inverting eyepiece is ordered. Diagonal prism with color glass. For adjustment of the line of collimation the telescope may be revolved 180° in its axis socket. The vertical position of the vertical wire is insured by a "stop" placed in the telescope socket. Clamp and tangent to telescope axis. 4° vertical arc graduated 0° to 60° reading by adjustable vernier to single minutes. 4° box compass. Weight of instrument, $6\frac{1}{2}$ lbs. Complete in mahogany carry case.....\$108 00

No. 6764. Alidade, with 60° arc and axis tangent.....	\$75 00
Diagonal Eyepiece and Color Glass.....	8 00
5" Striding Level.....	13 00
Box Compass.....	12 00

PLANE TABLE TRIPOD



No. 6770.

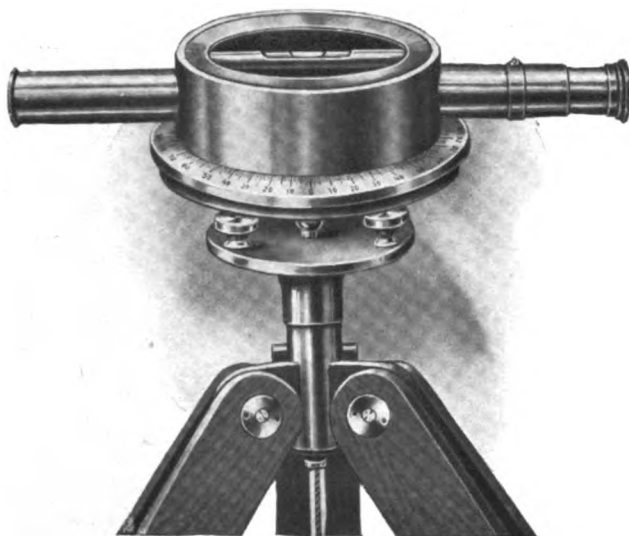
This leveling arrangement is simple, allowing sufficient accuracy for the purpose intended in shifting both horizontally and vertically.

Its construction consists of two hemispherical segments movable one within another, which movement is controlled by a pair of wing nuts.

Plane Table Tripod, complete with straight grained hardwood legs.

Each, \$35 00

BOSTROM'S BUILDERS LEVEL



No. 6780.

A very desirable and reliable level for Builders, Carpenters and Stone Masons. Can be used for any kind of foundation work and determining angles of simple construction, easily understood and can be operated by any one.

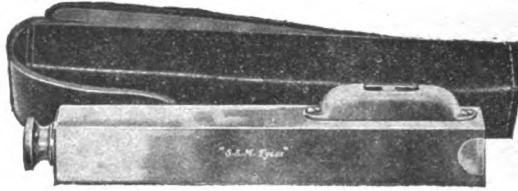
- No. 6780. Bostrom's Builders Level with plumb bob, tripod and graduated rod with target.....Each, \$25 00
6782. Bostrom's Builders Level, same as No. 6780, but with more powerful telescope and rack and pinion to eye-piece; plumb bob, tripod and graduated rod with target " 30 00

BOSTROM'S FARM LEVEL

This instrument is particularly adapted for farm use, terracing, ditching and irrigation work.

- No. 6790. Bostrom's Farm Level with circle graduated to degrees, plumb bob, tripod and graduated rod with target.....Each, \$15 00

HAND LEVELS



No. 6800.

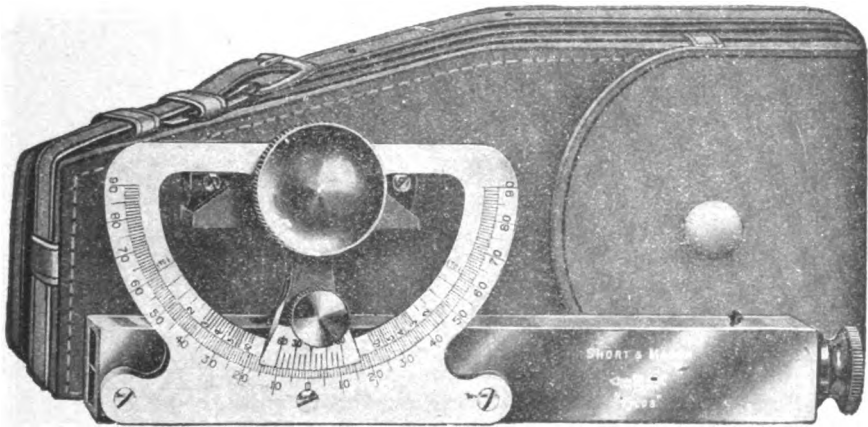
- No. 6800. Square Reflecting Hand Level, bronze metal case,
5" long, in leather case, complete.....Each, **\$4 00**



No. 6810.

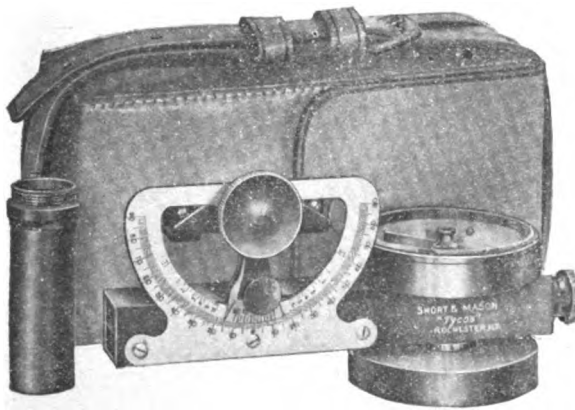
- No. 6810. Pocket Reflecting Hand Level, in bronze metal case,
5" long. Complete, in leather case.....Each, **\$5 00**
6812. Same as No. 6810, but German silver..... " **7 50**
6814. Same as No. 6810, but nickel-plated..... " **6 00**

HAND LEVELS—Continued



No. 6820.

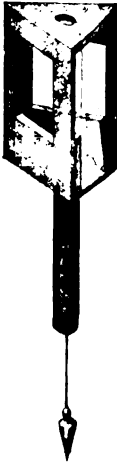
No. 6820. **Abney's Reflecting Level**, square bronze draw telescope, 5", German silver vertical arc 1", graduated in each direction to 90°, vernier reading to 10 minutes. Complete in leather sling case.....Each, \$15 00



No. 6824.

No. 6824. **Abney's Reflecting Level**, improved form, same as No. 6820 with addition of a high grade bar needle, jeweled center compass with stop. Below the compass is a circular table into which the socket tube is fitted, for using with Jacob-staff. Complete, in leather case.....Each, \$24 00

ANGLE MIRRORS



No. 6830.



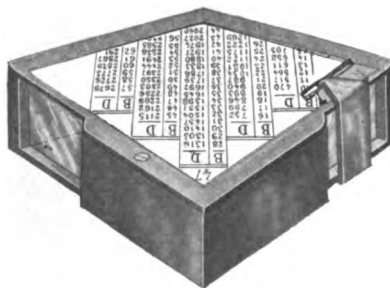
No. 6832.



No. 6836.

- | | | |
|-----------|---|--------------|
| No. 6830. | Angle Mirror, for right angles, with small plumb bob.
Size of instrument when packed, $3\frac{1}{4} \times 2 \times 1\frac{1}{4}$ ", in case.. | Each, \$7 50 |
| 6832. | Angle Mirror, for right angles, plain, in case..... | " 5 00 |
| 6834. | Angle Mirror, round brass box, parallel mirrors, with
adjusting screw, in case..... | " 6 50 |
| 6836. | Rectangular Prism, for angles of 90 degrees, in case... | " 4 50 |

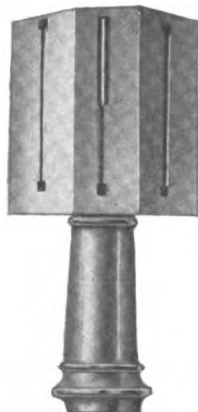
SOUCHIER'S PRISM TELEMETER



No. 6840.

- No. 6840. Souchier's Prism Telemeter. With this instrument, it is possible to calculate in less than 3 minutes the distance of any object with an average error of approximately $2\frac{1}{2}\%$Each, \$6 50

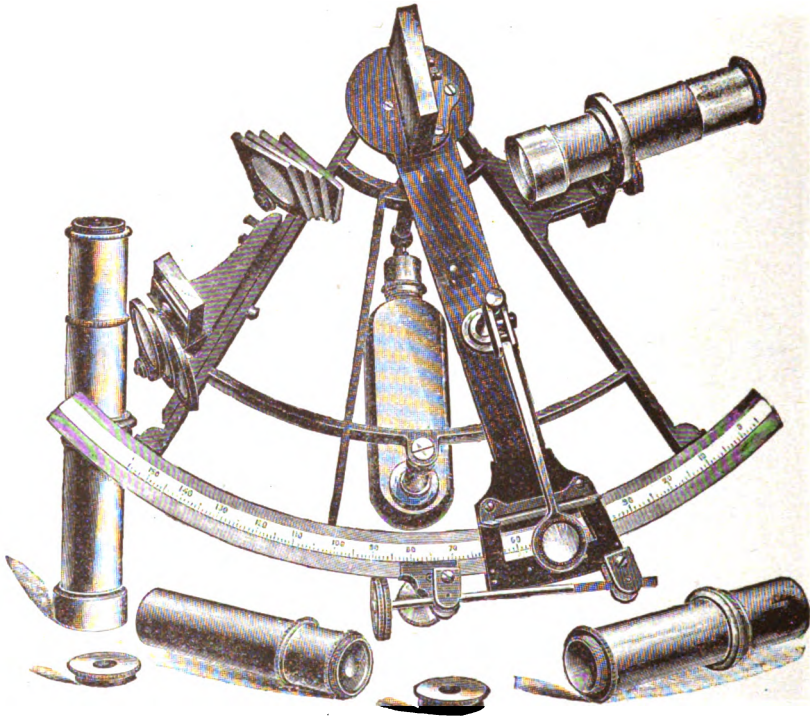
CROSS HEAD STAFFS



No. 6850.

- | | | |
|-----------|--|--------------|
| No. 6850. | Cross Head Staff, 2 $\frac{1}{2}$ ", octagonal, with staff socket, in case..... | Each, \$2 75 |
| 6852. | Cross Head Staff, 2 $\frac{1}{2}$ ", octagonal, with magnetic compass and staff socket, in case..... | " 4 50 |
| 6854. | Cross Head Staff, 3", octagonal, with staff socket, in case..... | " 3 50 |
| 6856. | Cross Head Staff, 3", octagonal, with magnetic compass and staff socket, in case..... | " 5 50 |

SEXTANT AND OCTANTS

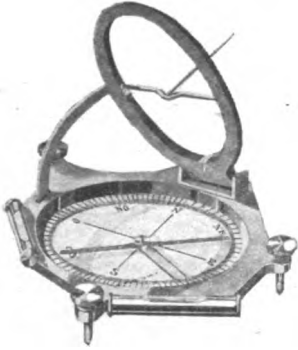


No. 6860.

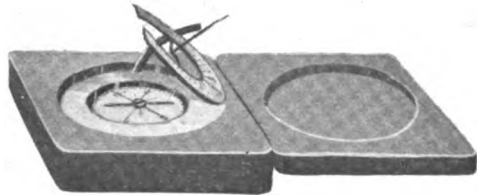
No. 6860. Sextant, high grade, of gun metal, measuring angles up to 130° , radius $7\frac{1}{2}$ ", graduations on silver to 10 minutes, vernier reading to 10 seconds, magnifying glass, clamp and tangent to vernier, 1 sighting tube, 1 star telescope, 1 inverting telescope with two eyepieces of magnifying power 6 and 12 diameters, 7 neutral glasses to sextant, 2 neutral glasses for telescope, 1 each spare index and horizon mirror. Instrument complete, with 2 screwdrivers, in polished mahogany case with lock, etc.....\$120 00

No. 6866. Octant of gun metal, measuring angles up to 100° , graduations on silver, vernier reading to 30 seconds, magnifying glass, clamp and tangent screw to vernier, 1 sighting tube, 1 star telescope, 2 neutral glasses for telescope, 1 each spare index and horizon mirror. Instrument complete, with 2 screwdrivers, in polished mahogany case with lock, etc.....\$80 00

UNIVERSAL SUN DIALS



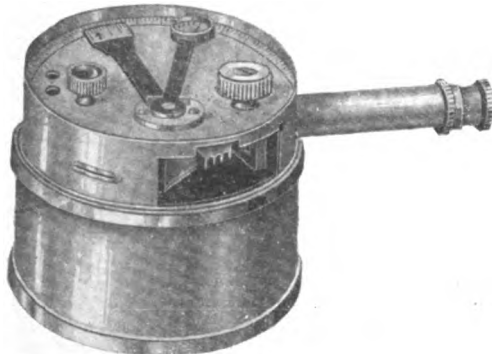
No. 6978



No. 6970

- No. 6870. Universal Sun Dial, diameter $2\frac{1}{2}$ " with 3 adjusting screws, 2 levels, divided circle, bar needle, agate cap with stop, in leather case.....Each, \$10 00
6876. Universal Sun Dial, like No. 6870, but $3\frac{1}{2}$ " diameter.... " 15 00
6878. Universal Sun Dial diameter about 4", divided circle, agate cap and stop. In mahogany box..... " 8 00

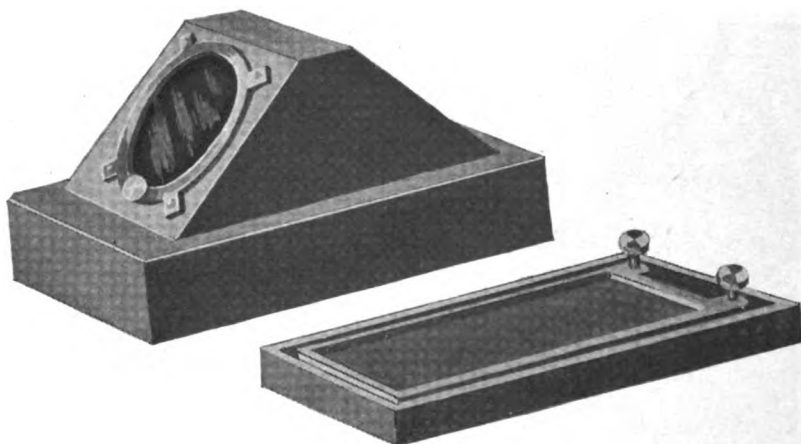
POCKET SEXTANT



No. 6880.

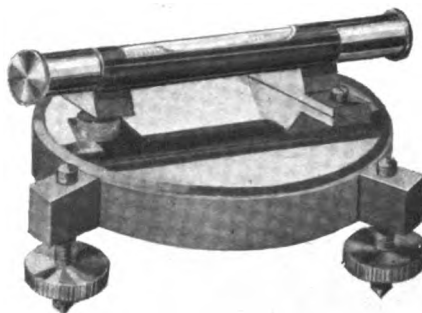
- No. 6880. Pocket Sextant, divided on silver to 30 minutes, vernier reading to 1 minute with telescope, 2 neutral glasses, reading lens and micrometer tangent screw; metal box 3" in diameter by $1\frac{1}{2}$ " high, in leather sling case.....Each, \$40 00

ARTIFICIAL HORIZONS



No. 6890.

- No. 6890. Mercurial Horizon, brass oxidized black, with parallel glass reflectors, $2\frac{1}{2}$ " diameter, movable mounts turning to 180° , with brass bottle for oil and boxwood for mercury. In Walnut case.....Each, \$30 00



No. 6896.

- No. 6896. Reflecting Horizon, $2\frac{1}{2}$ " diameter, black glass reflector, grey oxidized mounts, 3 leveling screws, level with adjusting screw, jointed and divided tube mounted on 3 points. Complete in walnut box.....Each, \$15 00
6898. Reflecting Horizon, same as No. 6896, but $4\frac{1}{2}$ " diameter " 17 50

CLINOMETERS

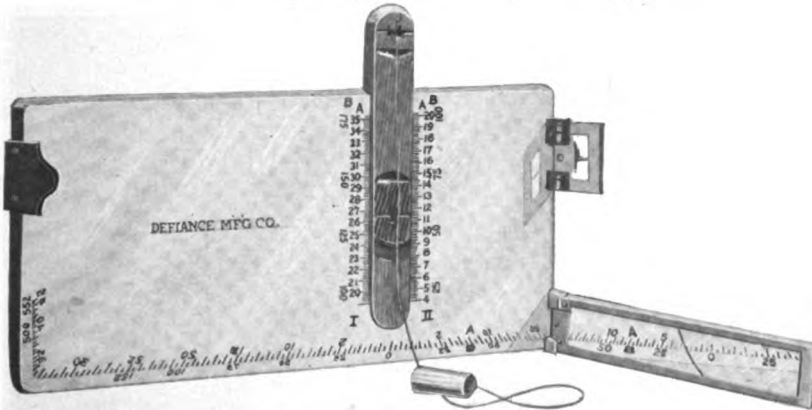


No. 6900.

- No. 6900. Boxwood Clinometer, 12", folding to 6", brass mountings, with one spirit level, compass and inclination scale, in leather case.....Each, \$3 50
6902. Boxwood Clinometer, like No. 6900, but with 2 spirit levels and with folding sights, in leather case..... " 11 50

HYPSONOMETERS

For Measuring Heights of Trees, Buildings, Etc.



No. 6910.

- No. 6910. Mirror-reading Hypsometer (after Faustmann), 7 × 3½", improved construction, of polished hardwood, graduations on white composition, protected by coating against atmospheric influences, with folding sights and hinged mirror, with scale of heights on base of instrument and scales of distances on either side of groove in which the slide moves. The slide to which the plumb bob cord is fastened is provided with two reading lines to correspond with the two scales of distances; in pocket with flap and directions.....Each, \$6 50
6912. Mirror-reading Hypsometer (after Faustmann), like No. 6910, but made of brass, with graduations on silvered surface, folding sights and hinged mirror; in pocket with flap and directions..... " 19 50

PLANIMETERS

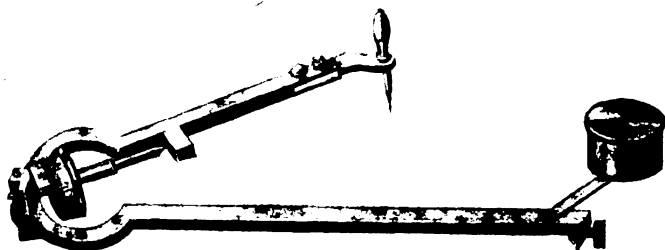
The Planimeter affords the most simple and convenient method of measuring the area of plane surfaces and drawings and plans. The accuracy of the results obtained by carefully adjusted and properly used Planimeters cannot be equalled by any compass or scale method of mensuration. The time saved by using these instruments is very considerable.

The computation of such areas is made by following the outline of the figure by means of a tracer. Connected with the tracing arm is a record wheel, which rests on the tracer, and is set in motion by the act of tracing over the figure. The advance of this recording wheel, multiplied by a simple factor, gives the area of the figure in square inches, acres, square solidimeters, etc., according to the unit and scale of the plan.

The divisions of the recording wheel vernier and accounting disc are made on a white material, to enable quick and reliable readings, and do not fatigue the eyes.

The integrating wheel is made of hard steel, and therefore very resistant against wear and rust.

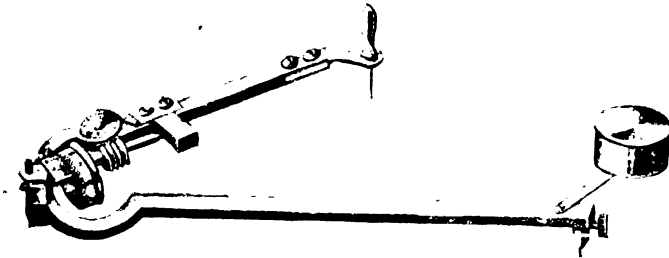
All Planimeters are provided with an adjustable foot, which prevents the tracer being hindered in its travel by little holes, etc., in the paper, or spoiling the paper of the diagram or plan to be measured.



No. 6950.

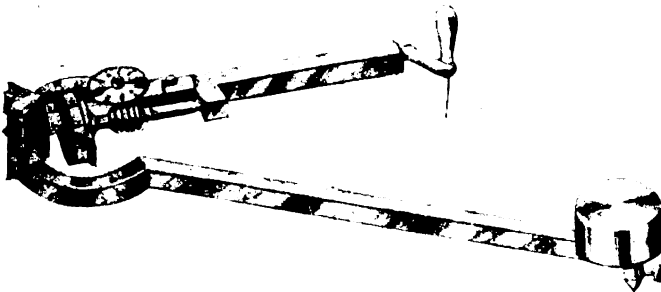
No. 6950. Polar Planimeter, German Silver, fixed tracer arm, improved needle point, measures up to 10 square inches in 10ths and 100th of a square inch. With directions, in case..... \$13 50

PLANIMETERS—Continued



No. 6952.

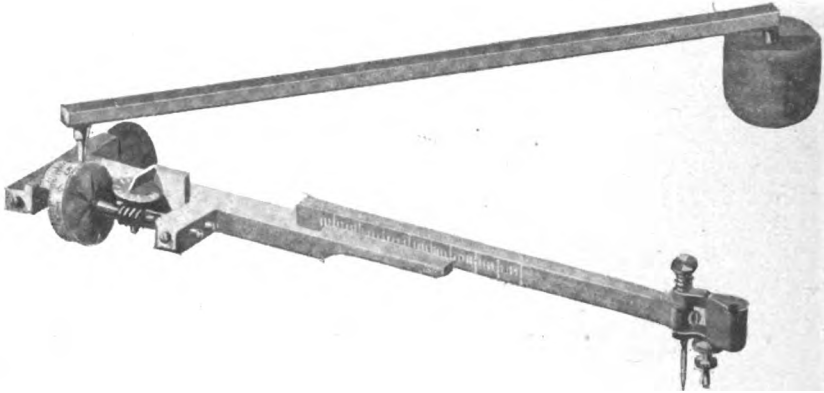
No. 6952. Polar Planimeter, brass, fixed tracer arm, improved needle point with a horizontal disc, recording wheel, revolutions up to 10, so that areas up to 100 square inches can be measured. Made to scales 1.1, 1.10, 1.100. With directions, in case..... \$15 00



No. 6954.

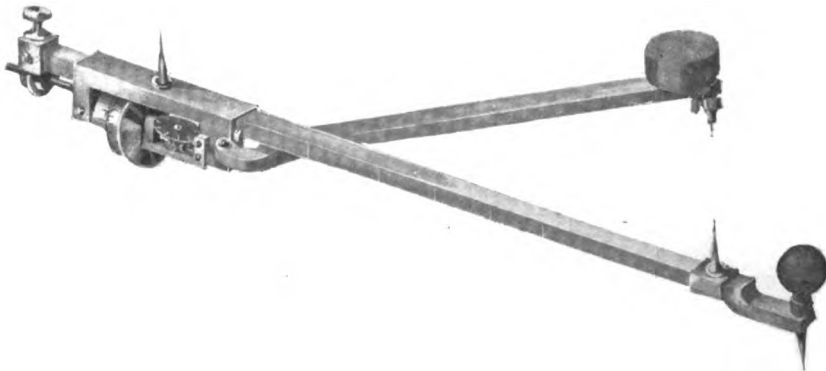
No. 6954. Polar Planimeter, like No. 6952, but German Silver..... \$19 00

PLANIMETERS—Continued



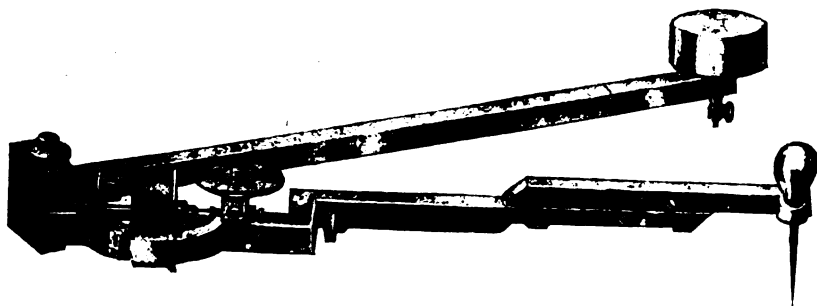
No. 6955.

- No. 6955. Polar Planimeter, German silver, adjustable tracer arm, provided with four index marks and table, giving settings for 14 ratios, with clamp and tangent screw. In case, with directions \$27 50



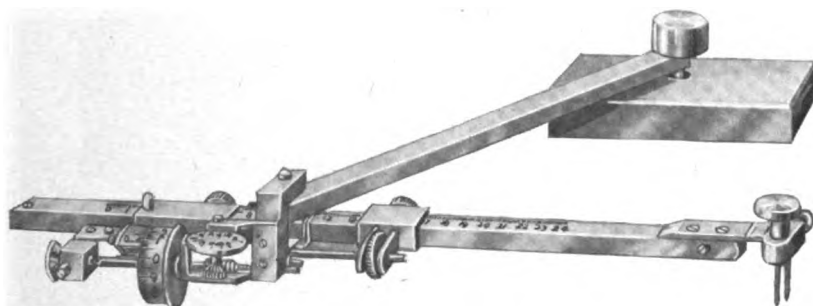
- No. 6956. Polar Planimeter, German silver, similar to No. 6955, but with special device for finding the mean height of indicated diagrams. With directions, in case..... \$30 00

PLANIMETERS—Continued



No. 6958.

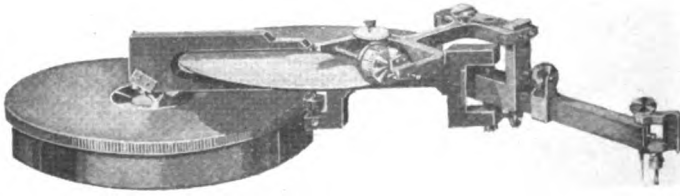
- No. 6958. Polar Planimeter, German silver, for measurements with needle pole; tracer arm so arranged that it can be shortened or lengthened, and set in parallel position to axis of roller, with testing rule, in case.....Each, \$21 00



No. 6959.

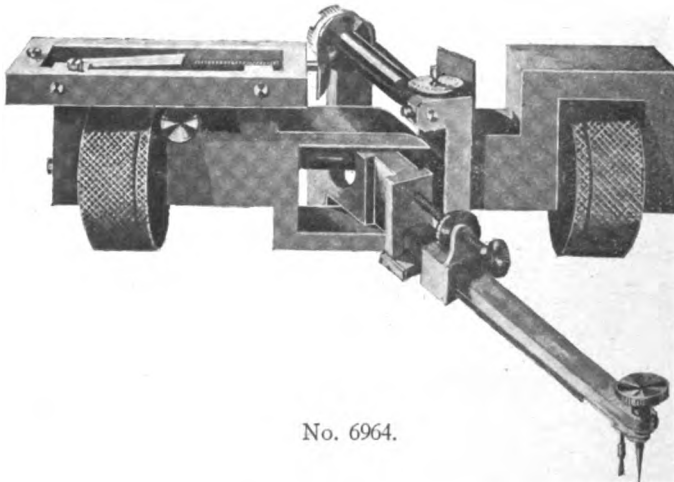
- No. 6959. Polar Planimeter of German silver; the tracer arm is divided in $\frac{1}{2}$ millimeters and with proportion marks for any reduction scales to be indicated at will. The sleeve on the tracer arm is adjustable over the entire length of the tracer arm and has a vernier reading to $\frac{1}{20}$ millimeter. The conveniently accessible correction screws have the purpose of setting the axis of the roller with the tracer arm parallel to the connection line of the tracing point with the pivot of the polar arm. With pole and needle testing rule fitted into morocco case, with lock, in such manner that the instrument may be laid in, set to any proportion, with directions..Each, \$33 00
6960. Polar Planimeter of German silver, like No. 6959, but with special device for finding the mean height of indicator diagrams; the points are protected by screw caps. With directions, in case.....Each, 35 50

PLANIMETERS—Continued



No. 6962.

- No. 6962. Suspended Ball Planimeter, German silver and brass; tracer arm is $11\frac{1}{4}$ " long, pole arm $6\frac{1}{4}$ " long, and diameter of the toothed circle on the pole $6\frac{1}{4}$ " long. The angular motion of the tracer arm is about 90° . Surfaces from $2\frac{1}{2} \times 4$ " to 7×10 " can be measured without moving the pole. Instrument complete, in morocco case, and complete book of instructions Each, \$85 00

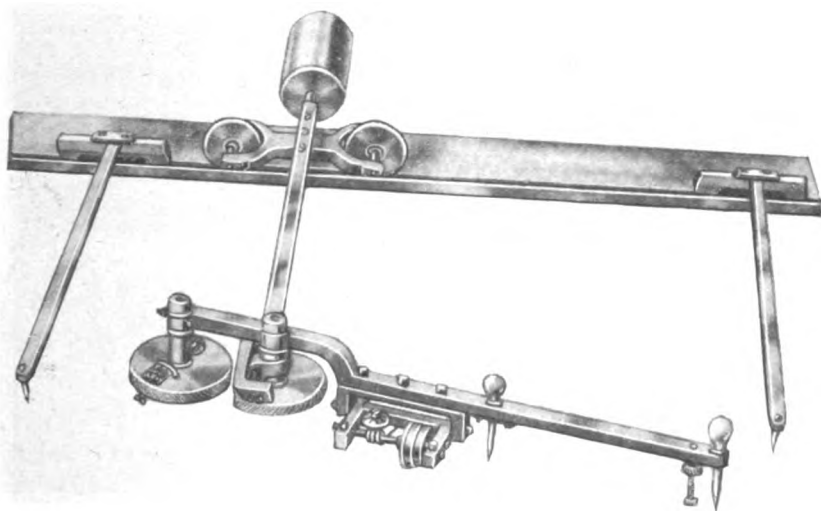


No. 6964.

- No. 6964. Rolling Ball Planimeter, German silver and brass, having tracer arm $11\frac{1}{4}$ " long, which can be increased by a lengthener to $19\frac{1}{4}$ ". Its angular motion is about 90° . The two rollers are made of exactly equal diameters, insuring the motion of the instrument, as a whole, to a straight line. A surface of any length and of a width of 20 inches can be measured with $19\frac{1}{4}$ " tracer arm. Instrument complete, in morocco case, and complete book of instructions.... Each, \$95 00

With each planimeter a table is supplied, fixed in the case. This table contains the lengths of the tracer arm separately determined for each instrument, and the values of the units of the vernier (and of the constants for polar planimeters) for four or five scales.

AMSLER'S MECHANICAL INTEGRATORS



No. 6970.

The Integrator may be used in Naval Architecture for measuring displacement, center of buoyancy, volume and center of holds, and for calculations of stability. In general work, this instrument is valuable whenever areas, moments, centers of gravity of diagrams, volumes of solids of rotation are to be determined. The Integrator is of simple construction, easily operated, and a complete book of directions is furnished with each instrument.

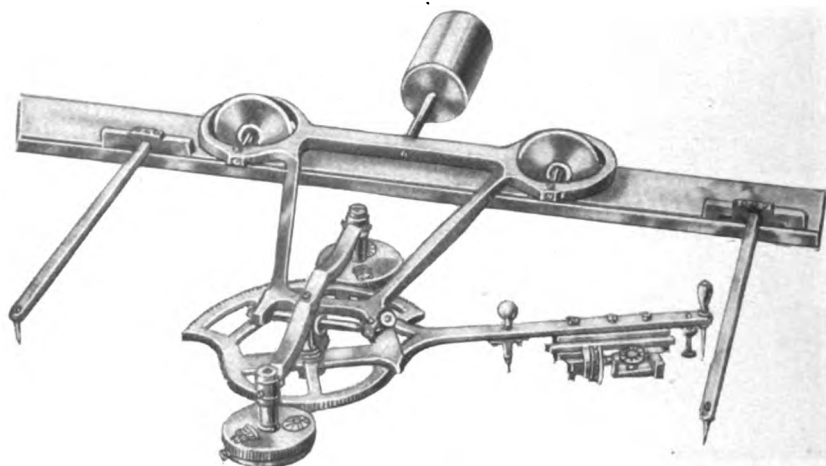
- No. 6970. Amsler's Integrator, of German silver, with two independent recording devices, one giving the moment of figure, the other the area with two tracing points, two gauges for fixing axis of moments, with grooved steel rail, in polished hardwood case, with directions.....Each, \$110 00
6972. Amsler's Integrator, like No. 6970, but of brass..... " 90 00

DIMENSIONS:

Longitudinal range.....	26"
Transverse range.....	15"
Length of rail.....	29"
Distance from rail to axis of moments.....	7½"

Grooved Steel Rails of other length furnished to order.

AMSLER'S MECHANICAL INTEGRATORS—Continued



No. 6974.

This instrument has three recording mechanisms, giving the area, moment and moment of inertia; two tracing points and two gauges for adjusting instrument to axis of moments.

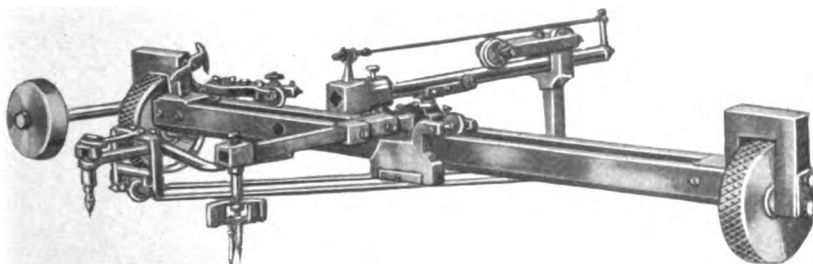
- No. 6994. Amsler's Integrator, of German silver, in polished hardwood case, grooved steel rail 59" long, in separate case, with complete book of instructions.....Each, \$175 00
6976. Amsler's Integrator, of brass, in hardwood case, grooved steel rail 59" long, in separate case, with complete book of instructions..... " 150 00

DIMENSIONS:

Longitudinal range.....	50"
Transverse range.....	13"
Length of rail.....	59"
Distance from rail to axis of moments.....	7½"

Grooved Steel Rails of other length furnished to order.

MECHANICAL INTEGRAPH



No. 6980.

The Integraph has proved to be of considerable aid to Civil and Mechanical Engineers and particularly Naval Architects. To the bridge builder it is invaluable, being a great help in ascertaining with great rapidity the moments of tensile strength, etc., of a bridge.

With this instrument the different moments, curves of stability and inertia can be readily computed the same as is done with the integrator, but the integraph has one advantage—with the integrator it is necessary to compute the several curves point by point and to construct them by means of the computed points, while the integraph directly draws the curves on the paper, thus giving a graphical representation of the integration.

The manipulation of the instrument is simple. The operator draws the principal points through the outlines of the different curves to be calculated. The pen or pencil point automatically draws the integral lines and not only can the result be read off on the graduated bar, but the whole course of integration (differential curves) is shown.

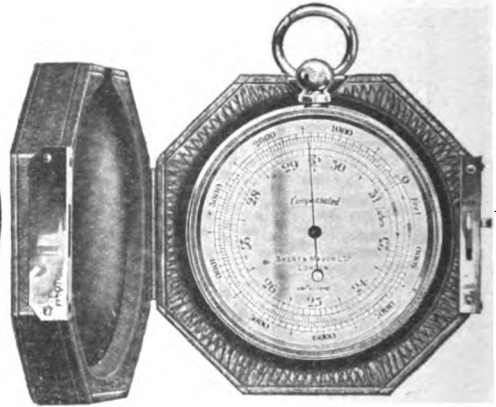
- No. 6980. Mechanical Integraph, German silver and brass, of improved construction and great accuracy. The instrument rests on two broad rollers. Movement of the balances is 26 centimeters, the basis may be set from 2" to 5", and has a lateral movement of 10.3". The bar is graduated to 1/10" with vernier reading to 1/100" and micrometer screw; pen and pencil point is attached to the sliding rack of the instrument. In walnut case with testing rule and directions.....Each, \$175 00
6982. Mechanical Integraph, like No. 6980, but with possible setting from 4" to 8", and with lateral movement of 20½"..... " 240 00

ANEROID BAROMETERS

Short & Mason



No. 6990.



No. 6994.

- No. 6990. Watch Pattern Aneroid, gilt case, 1 $\frac{1}{4}$ " diameter, silver metal dial, fixed altitude scale 8,000 ft. in 100 ft. divisions, revolving pointers, compensated for temperature. Complete in morocco case.....Each, \$9 00
6992. Same as No. 6990, but of better quality..... " 13 50
6994. Watch Pattern Aneroid, gilt case, 1 $\frac{1}{4}$ " diameter, with altitude scale 8,000 ft. in 50 ft. divisions, compensated for temperature. Complete in morocco case..... " 19 25
6996. Same as No. 6994, but altitude scale 3,000 ft. in 10 ft. divisions " 21 50
6998. Same as No. 6994, but altitude scale 5,000 ft. in 20 ft. divisions " 20 00
7000. Same as No. 6994, but altitude scale 10,000 ft. in 100 ft. divisions " 20 00
7002. Same as No. 6994, but altitude scale 12,000 ft. in 100 ft. divisions " 20 75
7004. Same as 6994, but altitude scale 16,000 ft. in 100 ft. divisions " 22 50
- Aluminum case for any of the above numbers..... " 2 50

ANEROID BAROMETERS—Continued



No. 7010.



No. 7022.

No. 7010.	Pocket Pattern Aneroid, 2½" gold-plated case, silvered metal dial with altitude scale 8,000 ft. in 50 ft. divisions, compensated for temperature. Complete in morocco case	Each, \$20 50
7012.	Same as No. 7010, but altitude scale 3,000 ft. in 10 ft. divisions	" 22 50
7014.	Same as No. 7010, but altitude scale 5,000 ft. in 20 ft. divisions	" 21 25
7016.	Same as No. 7010, but altitude scale 10,000 ft. in 50 ft. divisions	" 21 25
7018.	Same as No. 7010, but altitude scale 12,000 ft. in 50 ft. divisions	" 22 25
7020.	Same as No. 7010, but altitude scale 16,000 ft. in 100 ft. divisions	" 23 50

As supplied to U. S. Weather Bureau, U. S. Forest Service, U. S. Geological Survey Bureau of Mines, Coast and Geodetic Survey Bureau, Plant Industry, U. S. Signal Corps, etc.

No. 7022.	Pocket Pattern Aneroid, 2½" diameter gilt case, compensated for temperature, double circle on dial graduated to show altitude of 5,000 ft. in single 5 ft. divisions in a repeating circle of divisions. The outside scale is divided to 10 ft. divisions while the scale directly beneath it subdivides it to 5 ft. divisions, no vernier magnifier being required. Complete in flat pigskin case.....	Each, \$60 00
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ANEROID BAROMETERS—Continued



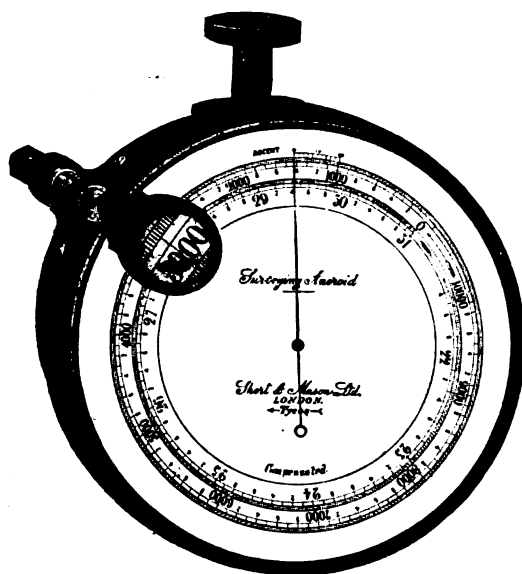
No. 7024.



No. 7036.

- | | | |
|-----------|--|---------------|
| No. 7024. | Watch Pattern Aneroid, compensated for temperature, gold plate case 1½" diameter; Hunters style, with altitude scale 8,000 ft. in 50 ft. divisions. Complete in morocco case..... | Each, \$21 50 |
| 7026. | Same as No. 7024, but altitude scale 3,000 ft. in 10 ft. divisions | " 23 25 |
| 7028. | Same as No. 7024, but altitude scale 5,000 ft. in 20 ft. divisions | " 22 00 |
| 7030. | Same as No. 7024, but altitude scale 10,000 ft. in 100 ft. divisions | " 22 00 |
| 7032. | Same as No. 7024, but altitude scale 12,000 ft. in 100 ft. divisions | " 22 50 |
| 7034. | Same as No. 7024, but altitude scale 16,000 ft. in 100 ft. divisions | " 24 50 |
| | Aluminum case for any of above numbers.....Extra, | " 2 50 |
| 7036. | Watch Pattern Aneroid, compensated for temperature, 1½" diameter gold-plated case, silver metal dial with altitude scale 8,000 ft. in 50 ft. divisions with small compass and thermometer on reverse side. Complete in morocco case..... | Each, \$29 25 |
| | Aluminum case for No. 7036.....Extra, | " 5 50 |

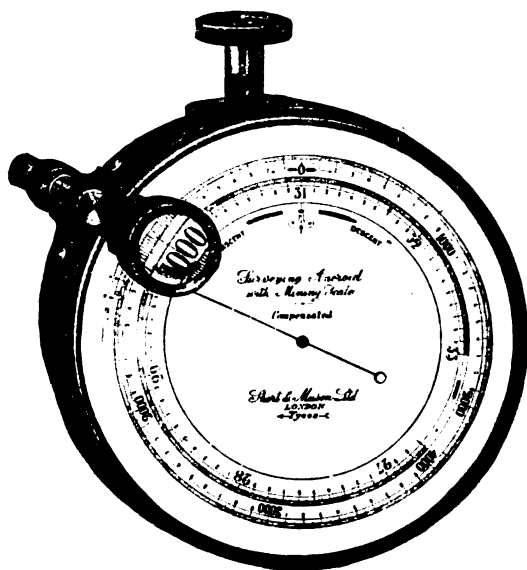
SURVEYING ANEROID BAROMETERS



No. 7040.

No. 7040.	Surveying Barometer, 3" diameter bronzed metal case, silver metal dial, altitude scale 6,000 ft. with vernier scale, moved by rackwork motion reading to 1 ft., compensated for temperature, adjustable reading lens. Complete in leather sling case.....	Each,	\$63 00
7042.	Same as No. 7040, but 3,000 ft. altitude scale.....	"	66 25
7044.	Same as No. 7040, but 10,000 ft. altitude scale with vernier reading to 2 ft.....	"	65 50
7046.	Same as No. 7040, but 16,000 ft. altitude scale with vernier reading to 2 ft.....	"	69 00
	Aluminum case for any of above numbers.....	Extra,	5 00
7048.	Same as No. 7040, but 5" diameter. Complete in leather sling case.....	"	68 00
7050.	Same as No. 7048, but 3,000 ft. altitude scale.....	"	71 25
7052.	Same as No. 7048, but 10,000 ft. altitude scale with vernier reading to 2 ft.....	"	70 50
7054.	Same as No. 7048, but 16,000 ft. altitude scale with vernier reading to 2 ft.....	"	74 00
	Aluminum case for any of above numbers.....	Extra,	7 00

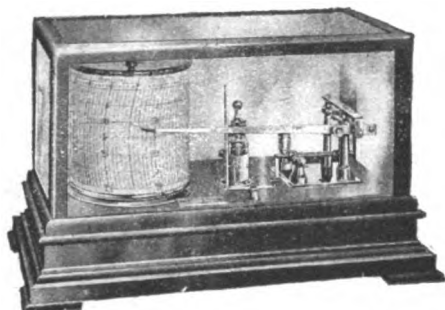
SURVEYING ANEROID BAROMETERS—Continued



No. 7056.

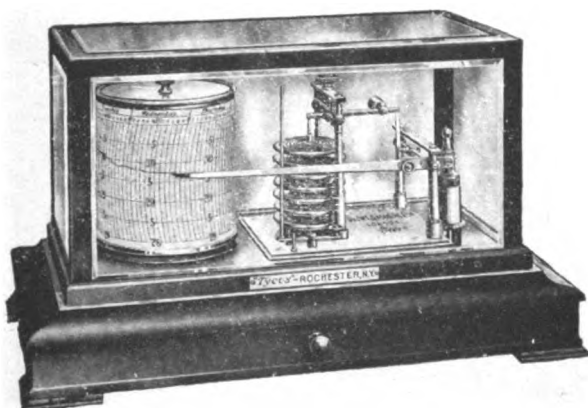
- No. 7056. Mining Barometer, 3" diameter bronzed case, silver metal dial with vernier scale moved by rackwork motion reading to 1 ft., altitude scale 4,000 ft. ascent, 2,000 ft. descent, compensated for temperature, adjustable reading lens. Complete in leather sling case.....Each, \$63 00
7058. Same as No. 7056, but 5" diameter..... " 68 00

BAROGRAPHS AND THERMOGRAPHS



No. 7060.

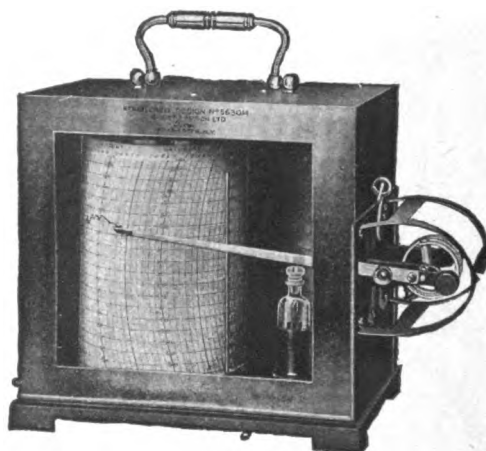
No. 7060. Stormograph, simplified form, recording one week. The movement is operated by a large vacuum chamber concealed in the base of the instrument. The best popular priced Barograph on the market. The clock is of the same goods as the more expensive pattern instruments. Complete with ink and charts.....Each, \$40 00



No. 7062.

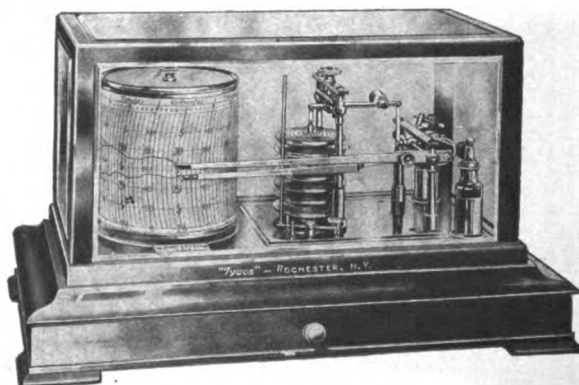
No. 7062. Recording Barometer, range 28" to 31", 14½" long, 8" high, 8¾" deep, beveled plate glass cover, mahogany frame, with drawers of two divisions for holding used and unused charts. Complete with ink and charts.....Each, \$63 00

BAROGRAPHS AND THERMOGRAPHS—Continued



No. 7064.

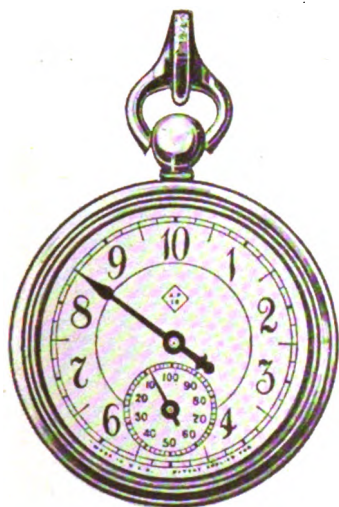
- No. 7064. Thermograph recording one week, bi-metallic exposed lamina, insuring perfect circulation of air round it. Can be arranged to show any temperature covering 75° Fahrenheit, 150° Fahrenheit or 300° Fahrenheit range. A "Kew" certified mercurial thermometer supplied with each instrument. Hinged copper end, cast metal base.....Each, \$50 00



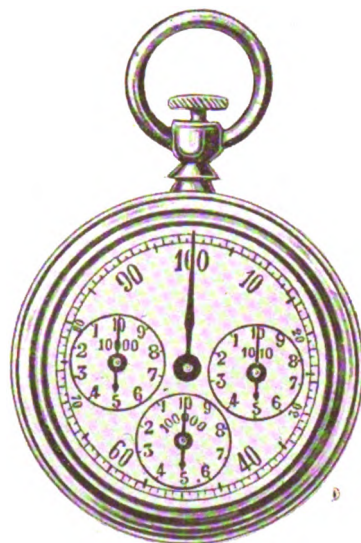
No. 7066.

- No. 7066. Combined Stormograph and Thermograph, both recording on single chart for one week. Range of Barometer is from 28" to 31", while the thermometer shows a range of 0° to 120° in 2° lines. Complete with two different colored inks (blue for Barometer and green for Thermometer) and supply of charts. In mahogany case with drawer, beveled plate glass cover.....Each, \$88 00

PEDOMETERS AND ODOMETERS



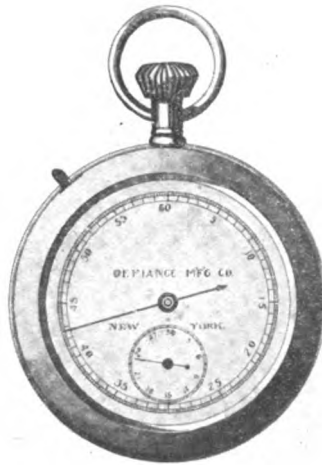
No. 7070.



No. 7074.

- | | | |
|-----------|--|--------------|
| No. 7070. | Pedometer, watch pattern, nickel case, registering distance walked to 10 miles..... | Each, \$1 25 |
| 7072. | Pedometer, watch pattern, nickel case, registering distance walked to 100 miles..... | " 1 25 |
| 7074. | Passometer, watch pattern, nickel case, with 3 hands, registering 25,000 steps..... | " 6 00 |
| 7076. | Passometer, watch pattern, nickel case, with 4 hands, registering 100,000 steps..... | " 6 50 |

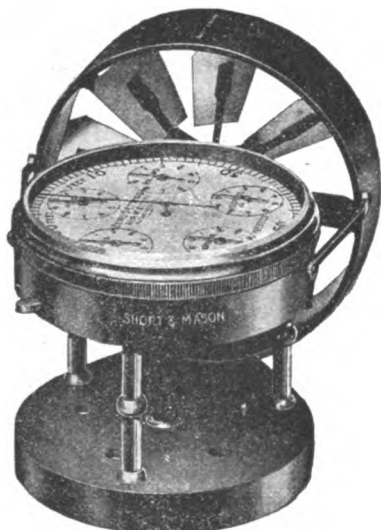
STOP WATCHES



No. 7080.

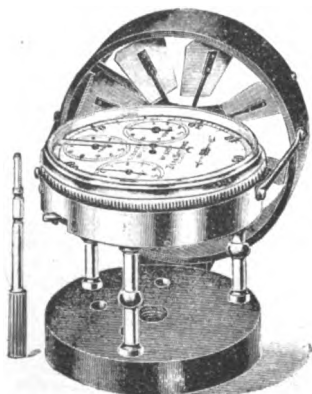
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| No. 7080. | Stop Watch, stem-winder, nickel-plated case, 2 hands, registering $1/5$ seconds up to 10 minutes..... | Each, \$5 00 |
| 7082. | Stop Watch, like No. 7080, but registering $1/5$ seconds up to 30 minutes..... | " 5 50 |
| 7084. | Stop Watch, best quality, like No. 7080, with 3 pressure bow..... | " 7 00 |

ANEMOMETERS AND WIND GAUGES



No. 7090.

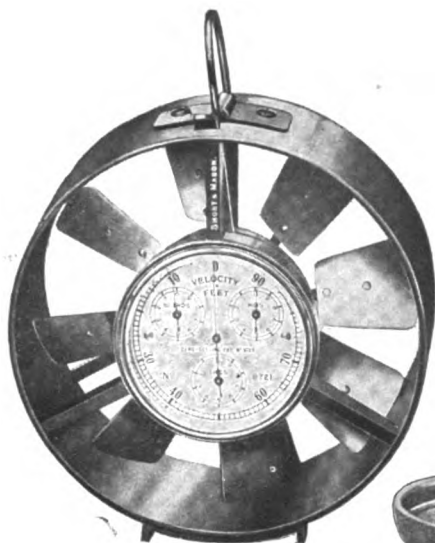
- No. 7090. Portable Air Meter, diameter of fan wheels 2 $\frac{3}{4}$ " with disconnecter. The indications are obtained by means of a delicate poised fan wheel, the recording being commenced by the long hand, traverses the outer circumference of the main dial, showing the passage of 100 ft. air. The enumeration is contained up to 10,000,000 ft. by a series of smaller dials. In leather case.....Each, \$30 00
7092. Same as No. 7090, but with sand glass timer. In leather case..... " 33 50



No. 7094.

- No. 7094. Portable Air Meter, 4 dials reading to 100,000 ft. with zero setting attachment. In leather case.....Each, \$30 00
7096. Same as No. 7094, but with sand glass timer..... " 33 50

ANEMOMETER OR WIND GAUGES—Continued



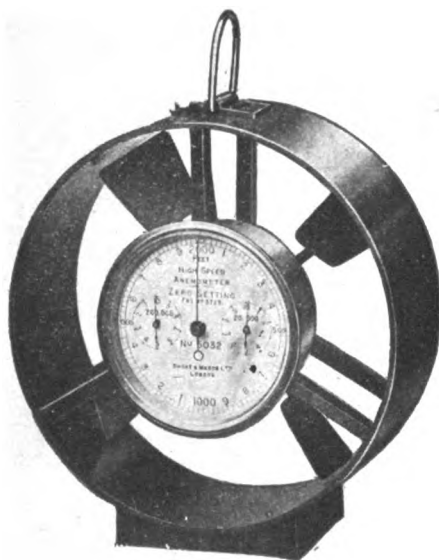
No. 7100.



No. 7106.

- | | | |
|-----------|---|---------------|
| No. 7100. | Biram's Anemometer, 3", 2 dials reading to 1,000 ft. with zero setting attachment. Complete in leather case | Each, \$25 00 |
| 7102. | Biram's Anemometer, 4", 4 dials reading to 100,000 ft. with zero setting attachment. Complete in leather case " | 28 00 |
| 7104. | Biram's Anemometer, 6", 4 dials reading to 100,000 ft. with zero setting attachment. Complete in leather case " | 35 00 |
| 7106. | Biram's Watch Pattern Anemometer, improved type, 2 dials reading to 1,000 ft., jeweled movement..... | " 40 00 |

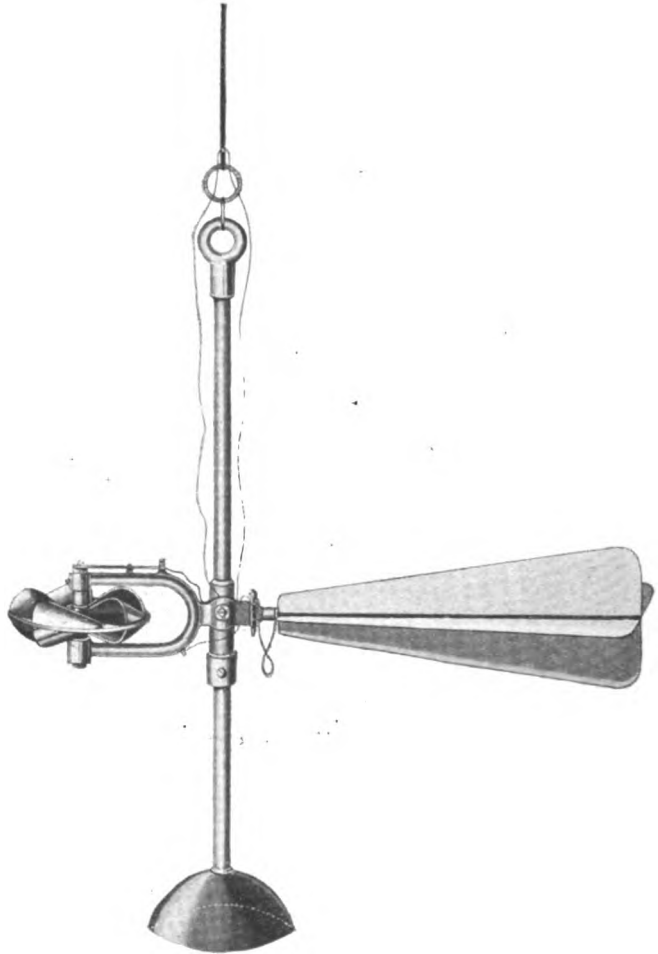
ANEMOMETER OR WIND GAUGES—Continued



No. 7108.

No. 7108. High Speed Anemometer registering to 200,000 ft. with disconnecter and zero setting attachment. Capable of registering to very strong blast currents. Complete in leather case.....Each, \$45 00

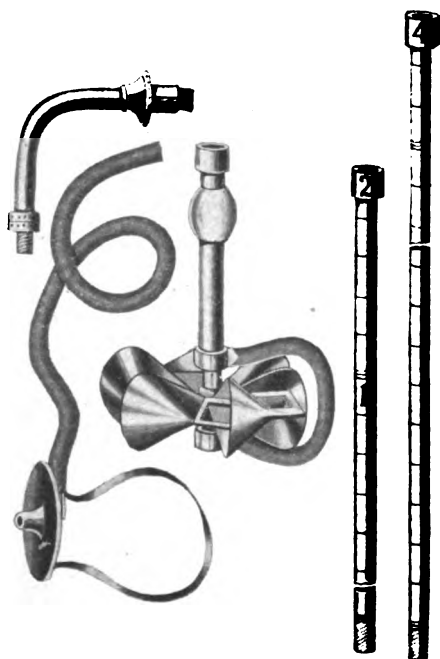
CURRENT METERS



No. 7120.

- No. 7120. Current Meter, specially adapted for deep water, river or harbor surveying. The meter may be used in connection with any apparatus for registering the number of revolutions by the breaks in the electric current.... Each, \$80 00
7122. Electric Register for No. 7120..... " 50 00
7124. Lead Weights, 60 lbs..... " 15 00

CURRENT METERS—Continued



No. 7130.

The revolutions of the wheel are indicated by one blow of a hammer striking a diaphragm once each ten revolutions.

The sound is transmitted to the ear through the brass tube (by which the meter is supported) with aid of rubber ear tube fastened about head.

No. 7130. Acoustic Current Meter, including two 2 ft. lengths of
nickel brass tubing graduated to feet and tenths....Each, \$50 00

7132. Extra lengths of tube, each 2 ft..... " 2 50

HYDROMETRIC TUBE

(Pitot's Tube)

This is another type of instrument for measuring the velocity of currents, and consists, principally, of two parallel tubes connected at the top, the lower ends being bent at right angles so that the openings are in opposite directions.

To measure the velocity of currents, the instrument is immersed into the stream directing one opening against the stream, thus causing the water to rise higher in the up stream tube than in the downward directed one. The difference in height of the two water columns is the velocity, which is proportional to the square of the speed in meters per second.

As it will be necessary for the convenient observation of the height of the water in the tubes, to bring the water above the surface of the stream, a small pump has been attached to the top of the tubes with which the air pressure above the water columns can be reduced; this permits the water to rise in the tubes proportionally without affecting the difference of height in the least. The instrument is further provided with a faucet below the glass tubes with which the flow of water can be shut off as soon as the water columns have assumed a steady position. It may then be withdrawn from the stream to a convenient position, and with the aid of the sliding sight the readings of both tubes can be taken with the mm. scale provided for that purpose.

The Hydrometric Tube is particularly well adapted for use in shallow waters where the Current Meter, on account of its size and construction, cannot be used advantageously.

With each instrument is furnished a correct formula for determining the velocity, where:

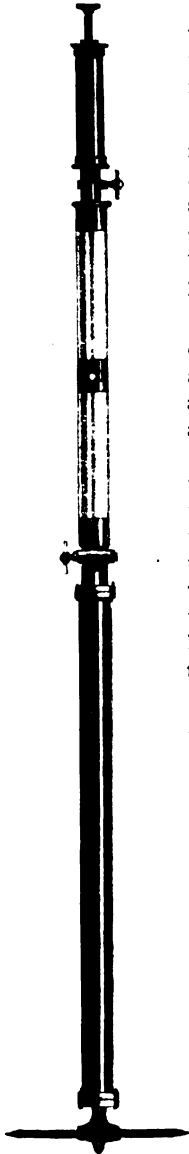
V = velocity in meters per second.

h^2 = height of water column in mm.

h^1 = " " " " " "

Thus $V = 0.14 \sqrt{h^2 - h^1}$

No. 7140. Hydrometric Tube, in polished hardwood case, weight complete about 20 lbs., Each, \$110 00



No. 7140.

MAGNIFYING GLASSES

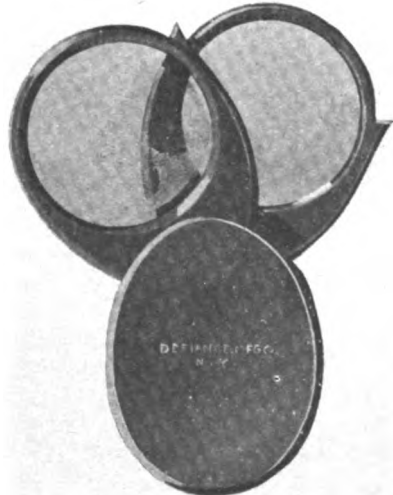


No. 7150.

- No. 7150. Reading Glasses, German Silver rim, black handle, finest quality.
 Diameter $1\frac{1}{2}$ " 2" $2\frac{1}{2}$ " 3" $3\frac{1}{2}$ " 4" $4\frac{1}{2}$ " 5"
 Each \$0 50 \$0 55 \$0 75 \$0 90 \$1 20 \$1 75 \$2 25 \$2 75
7152. Reducing Glasses, mounted in nickel-plated frames, polished wooden handle.
 Diameter 2" 3"
 Each \$1 25 \$1 75



No. 7154.



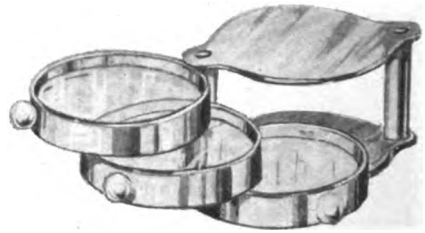
No. 7158.

- No. 7154. Mounted in rubber, 1 lens, 1 " diameter.....Each, \$0 35
 7156. " " " 1 " $1\frac{1}{2}$ " " " 55
 7158. " " " 2 " $1\frac{1}{2}$ " " " 60
 7160. " " " 2 " $1\frac{1}{2}$ " " " 90

MAGNIFYING GLASSES—Continued

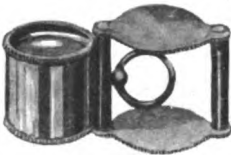


No. 7170.

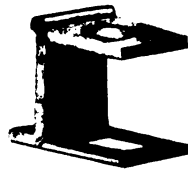


No. 7174.

No. 7170.	Mounted in metal, nickel-plated, 1 lens, 1" diameter...	Each,	\$0 75
7172.	" " " " 2 " 1" " ... "		1 00
7174.	" " " " 3 " 1" " ... "		1 30



No. 7180.



No. 7186.



No. 7188.

No. 7180.	Coddington Lens, metal folding frame, nickel-plated, $\frac{1}{2}$ " diameter.....	Each,	\$1 50
7182.	Coddington Lens, metal folding frame, nickel-plated, 1" diameter.....	"	2 00
7184.	Coddington Lens, metal folding frame, nickel-plated, $1\frac{1}{8}$ " diameter.....	"	3 50
7186.	Thread Counter, brass frame, 1" field.....	"	30
7188.	Magnifier, on 3 legs, brass, screw adjustment, 1" diam..	"	50
	(Of Best Quality)		

Furnished with lenses which are unequalled for definition.

FIELD AND MARINE GLASSES

Of Best Quality

Furnished with lenses which are unequalled for Definition



No. 7190.

No. 7190. Field and Marine Glasses, straight cross-bars with sun-shades, covered japanned mounts, in sole leather case with strap.

Lines	19	21	24	26
Each	\$12 50	\$15 00	\$17 50	\$20 00

7192. Field and Marine Glasses, best quality aluminum, Russian leather covered, polished mounts, straight bars.

Lines	19	21	24
Each	\$20 00	\$25 00	\$30 00

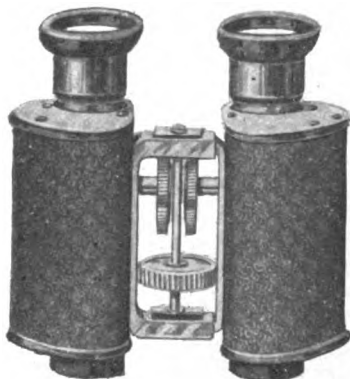
PRISMATIC STEREOPTIC BINOCULARS



No. 7200.

				Magnifying Power	Field of View at 1,000 yards	Each
No. 7200.	Prismatic Stereoptic Binocular			4	150 yards	\$40 00
7202.	"	"	"	6	100 "	40 00
7204.	"	"	"	8	115 "	45 00

GOERZ TRIEDER-BINOCULARS



No. 7206.

				Magnifying Power	Field of View at 1,000 yards	Each
No. 7206.	Goerz Trieder-Binocular.....			6	116 yards	\$57 50
7208.	"	"	8	77 "	67 50
7210.	"	"	12	58 "	77 50

SCIENTIFIC BOOKS

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